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ABSTRACT

This secondary vocational agricultural curriculum guide is one of a set of four designated as the basic core of instruction for vocational agriculture programs in Kansas. Units of instruction are presented in four sections: (1) Supervised Training Programs, (2) Leadership, (3) Plant and Soil Science, and (4) Farm Mechanics. Each unit is comprised of the following parts: terminal objectives, specific objectives, orientation with suggested instructor and student activities and references, information sheets, assignment sheets, unit test, and unit test answers. (YLB)

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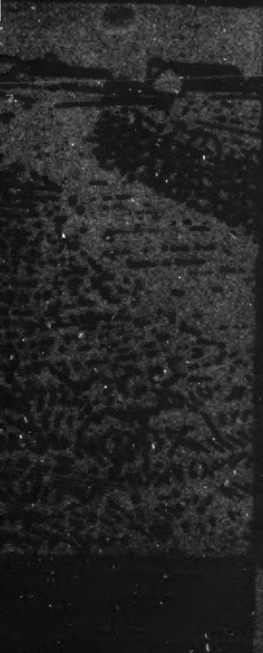
KANSAS VOCATIONAL AGRICULTURE EDUCATION

Basic Core Curriculum

IV



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ACKNOWLEDGMENTS

Appreciation is expressed to many individuals for their assistance in the preparation of this publication. As the basic content is built on the Vocational Agriculture IV, Oklahoma Curriculum Guide, special thanks are extended to the Oklahoma Curriculum and Instructional Materials Center personnel for their permission to reproduce and change their material, and especially to Bob Patton for his assistance in this modification and preparation.

Without the combined efforts of the Vocational Agriculture Section, State Department of Education, the Agricultural Education Section, Kansas State University, and the vocational agriculture teachers in KVATA, this publication would not have been possible.

FOREWORD

This publication is one of a set of four designated as the basic core of instruction for programs of Vocational Agriculture in Kansas. The Kansas Core will provide teachers of Vocational Agriculture with direction in the development and delivery of an instructional program for secondary agricultural students within the state.

Kansas is an agricultural production state. Its economy is dependent upon the ability to produce an abundance of raw agricultural products. The Kansas Core with localized information will provide students with technical information necessary to enter into the business of farming or ranching. The information contained in these publications must be supplemented with a well planned supervised farming program.

Since the majority of the off-farm agricultural occupations are closely associated with production agriculture the Kansas Core properly supplemented with information directly related to the student selected occupation may serve as a basic core to preparing for an off-farm agricultural occupation. Supervised occupational experience in the student's chosen occupation is a necessary component for an off-farm agricultural education program.

Appreciation is expressed to the Oklahoma State Board for Vocational and Technical education for permission to adapt the Oklahoma Core to Kansas conditions. Appreciation is also expressed to Dr. Ralph Field, Kansas State University, and the Vocational Agriculture teachers who dedicated their time to adapting the Oklahoma Core to Kansas conditions and to the writing of new units which are included in this publication.

Dean Prochaska, Director
Agricultural Education

The content of this publication was prepared and reviewed by:

Vocational Agricultural Instructors
KVATA

Gary Anderson
David Brothers
Gary Brownlee
Darrell Cordell
Truman Diener
Robert Dills
Eric Fiala
J. M. Frey
Len Harzman
Harold Helton
Jack Hockett
Scott Johnson
Charles Kerr
Tom Koehler
Bill Larson
Larry Schwintz
Wilbur Stites
Carl Stueve
Dennis Will
Billy Wood
Paul Young
Danny Oplotnik
George Robinson
Darrel Williams

Agricultural Education Staff
State Department of Education

Dean Prochaska
Damon Slyter
Dan Marrs
Les Olsen

Agricultural Education Staff
Kansas State Universtiy

James Albracht
Howard Bradley
Earl Baugher
Ralph Field
Paul Stevenson

Appreciation is also extended to Les Streit and Mark Mayfield for their contributions.

This publication was prepared under the supervision of Ralph Field, Agricultural Education Teacher Educator, Kansas State University.

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FARM RECORDS - FARM INVENTORIES
UNIT I

TERMINAL OBJECTIVES

After completion of Unit I, the student should be able to select the method of evaluation to use in farm inventories, compute depreciation, and construct a farm inventory. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with farm inventories.
2. Select from a list the general requirements that all inventories must include.
3. List factors that determine the time of year to inventory.
4. Match the method of valuation to be used on various type assets.
5. Discuss how to inventory crops that have been placed in a government loan.
6. Match the method of computing depreciation with the proper definition.
7. Apply the rule for determining the fraction when using the sum-of-the-digit method of depreciation.
8. Calculate depreciation, using three different methods.
9. Name two factors that determine the method of depreciation to use.
10. Select from a list the items that are normally depreciated.
11. Demonstrate the ability to construct a farm inventory when given the kind and number of assets for a simulated farm.

FARM RECORDS - FARM INVENTORIES
UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignemtn sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Provided in this unit:

1. Objectives
2. Information sheet
3. Transparency master
   - TM 1 - Comparison of Depreciation Methods
4. Assignment sheets:
   - #1 - Determining the Fraction to Use When Applying the Sum-of-the-Year Digit Method of Depreciation
   - #2 - Calculating Depreciation
   - #3 - Constructing a Farm Inventory
5. Answers to assignment sheets
6. Test
7. Answers to test

References:

1. Hopkins, John A. and Earl O. Heady. Farm Records and Accounting. Ames, Iowa: Iowa State University Press, 1962.
2. Castle, Emery N. and Manning H. Becker. Farm Business Management. New York: The Macmillan Company, 1967.

FARM RECORDS - FARM INVENTORIES
UNIT I

INFORMATION SHEET

I. Terms and definitions

   A. Inventory--An itemized list of goods or valuables with their estimated worth

   B. Depreciation--Decline in value of an asset due to such causes as wear and tear, action of elements, obsolescence, and inadequacy

   C. Capitalization--Process for placing a value on an asset based on its future earning power and expected interest rate

   D. Asset-Any item of value owned

II. General requirements all inventories must include

   A. Name of asset--Kind of unit

   B. Unit--This includes pounds, bushels, quarts, head, acre

   C. Quantity--This includes number of bushels, tons, pounds, heads, acres

III. Factors that determine inventory date

   A. Date when farm work begins for year's crop

   B. Date tenant moved to farm

   C. Date of lease renewal

   D. Date livestock shifted from winter feed to summer pasture

   E. If only enterprise was "feeding," inventory might be "between lots"

   F. Desirable when there is little else to do

   G. Period when there is small quantity of assets

   H. January 1 on general farms is most convenient because of tax purposes

   (NOTE: First five factors are based on significance in the farm operation, factors F, G, and H are bases on convenience to operator)

INFORMATION SHEET

IV. Valuation methods used on various types of assets

	Valuation Method	Type Asset
A.	Net selling price	Crops or livestock produced for market
B.	Cost less depreciation	Machinery and breeding livestock
C.	Cost or market price (whichever is lower)	Purchased farm supplies
D.	Replacement cost minus depreciation	Long-lived or fixed assets such as buildings
E.	Capitalization of earning power	Land, bonds, or livestock that gain in value

(NOTE: Basic formula for capitalization of earning power is: Value = annual income divided by rate of interest or $V = A/R$)

Example: Annual net income expected per acre is $10, rate of interest 5%, Value per acre is $V = 10/.05$ or $200 per acre

V. Crop inventory under government loan:

A. Crops produced during year that have been entered as a receipt should not be inventoried as an asset

B. If loan has not been entered as receipt, the government loan stock should be included on inventory

VI. Methods of computing depreciation (Transparency 1)

A. Straight line--Yearly depreciation consists of dividing total anticipated depreciation by the number of years asset is expected to last

(NOTE: An additional 20% first year depreciation on new or used tangible personal property may be used if proper provisions are met. Straight line is used on items that have relatively little technical change in value from year to year. Examples: breeding livestock, grain drill, disk, feeders, buildings.)

B. Diminishing balance--A fixed rate of depreciation is used every year and applied to the value of the asset at the beginning of the year.

(NOTE: The rate of depreciation should be near twice that used for straight line method. Diminishing balance is used on high use items or an item that has high loss of value rapidly. Example: tractor, combine.)

C. Sum-of-the-year-digit method--The annual depreciation is determined by multiplying a fraction times the amount to be depreciated

(NOTE: The amount to be depreciated is cost minus salvage value. Sum-of-the-year is basically the same as diminishing balance with exception that it allows more depreciation for the first few years and last few years with less in the middle years.)

VII Determining fraction to use with sum-of-the-year-digit method

A. The denominator is the sum of the years of life of the asset

Example: Asset with 10 years life, the denominator would be 55 (1+2+3+4+5+6+7+8+9+10=55)

Example: Asset with 7 years life, the denominator would be 28 (1+2+3+4+5+6+7=28)

B. The numerator of the fraction is the years of life remaining at the beginning of the accounting period

Example: Asset having 7 year life

Year of use	1	2	3	4	5	6	7
Life remaining (numerator) (denominator)	$\frac{7}{28}$	$\frac{6}{28}$	$\frac{5}{28}$	$\frac{4}{28}$	$\frac{3}{28}$	$\frac{2}{28}$	$\frac{1}{28}$

Example: Asset having 10 year life

Year of use	1	2	3	4	5	6	7	8	9	10
Life remaining (numerator) (denominator)	$\frac{10}{55}$	$\frac{9}{55}$	$\frac{8}{55}$	$\frac{7}{55}$	$\frac{6}{55}$	$\frac{5}{55}$	$\frac{4}{55}$	$\frac{3}{55}$	$\frac{2}{55}$	$\frac{1}{55}$

INFORMATION SHEET

VIII. Methods of calculating depreciation

A. Straight line method

1. Implement costing $1200.00 new
2. Expected life of 10 years
3. Salvage value of $100.00 when worn out
4. Would have annual depreciation of $1200.00 minus $100.00 divided by 10 or $110.00 per year

B. Diminishing balance method

1. Assume a $1200.00 asset
2. Expected life of 10 years
3. Salvage value of $100.00
4. Depreciation rate of 20% per year
5. Depreciation Schedule

Value at Beginning of Year	Annual Depreciation	Remaining Balance
a. 1st Yr. - $1,200.00	20% X $1,200.00 = $240.00	$960.00
b. 2nd Yr. - $960.00	20% X $960.00 = $192.00	768.00
c. 3rd Yr. - $768.00	20% X $768.00 = $153.60	614.40
d. 5th Yr. - $614.40	20% X $614.40 = $122.88	491.52
e. 6th Yr. - $491.52	20% X $491.52 = $98.30	392.22

f. 6th Yr. and following take 20% of the remaining balance until salvage value is reached.

C. Sum-of-the-year-digit method

1. Assume a $1200.00 asset
2. Ten year life
3. Salvage value of $100.00

INFORMATION SHEET

4. Depreciation Schedule

Value at Beginning of Year	Annual Depreciation	Remaining Balance
a. 1st Yr. - $1,200.00	10/55 X (1,200 - 100) = 200	1,200 - 200 = 1,000
b. 2nd Yr. - $1,000.00	9/55 X (1,200 - 100) = 180	1,000 - 180 = 820
c. 3rd Yr. - $820.00	8/55 X (1,200 - 100) = 160	820 - 160 = 660
d. 10th Yr. - $120.00	1/55 X (1,200 - 100) = 20	120 - 20 = 100

IX. Factors that determine method of depreciation to use

A. Method that most nearly approximates the loss in value of the asset

(NOTE: Declining balance and the sum-of-the-year-digit methods are used on assets that depreciate more rapidly early in life. Farm truck and equipment are examples of this type asset.)

B. Method easiest to compute--Straight line is easiest to compute and understand

X. Items that can be depreciated

A. Houses for rent or used by tenants

B. Barns, sheds, grainaries

C. Livestock purchased for breeding or dairy purposes

D. Automobiles (share used in business)

E. Trucks and trailers

F. Farm machines and equipment

G. Fences and drain tile

H. Water systems

(NOTE: Home as a residence and land are not depreciated.)

XI. Steps in constructing farm inventory

A. The entire inventory should be taken on a single day or as if of a single date

B. A count of numbers and a record of weights are sufficient for most types of livestock

INFORMATION SHEET

C. Horses, valuable sires, and registered breeding stock should be listed individually

D. When stored crops are inventoried, the bins or stocks should be measured and the contents estimated from dimensions found

E. Growing crops should be inventoried at their approximate cost to date

(NOTE: This is the most common method.)

Examples of farm inventories

LIVESTOCK INVENTORY

Description	Beginning of Year			End of Year			Number Died or Slaughtered
	No.	Avg. Weight	Total Value	No.	Avg. Weight	Total Value	
Hogs							
Old Sows	16	275#	$1600	18	300#	$1950	
Spring Pigs	112	45#	$5000	--	---	----	
Total	128	---	$6600	18	---	$1950	

FARM IMPROVEMENTS

Kind of Improvement	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (yrs.)	Deprec for yr	Balance
Barn	1963	$10,000	$4,500	St. line	20 yrs.	$500	$5,000
Fence 1000 rods	1970	$900	$80	St. line	20 yrs	$40	$780
Total		$10,900	$4580	--------	-----	$540	$5780

INFORMATION SHEET

MACHINERY AND EQUIPMENT INVENTORY

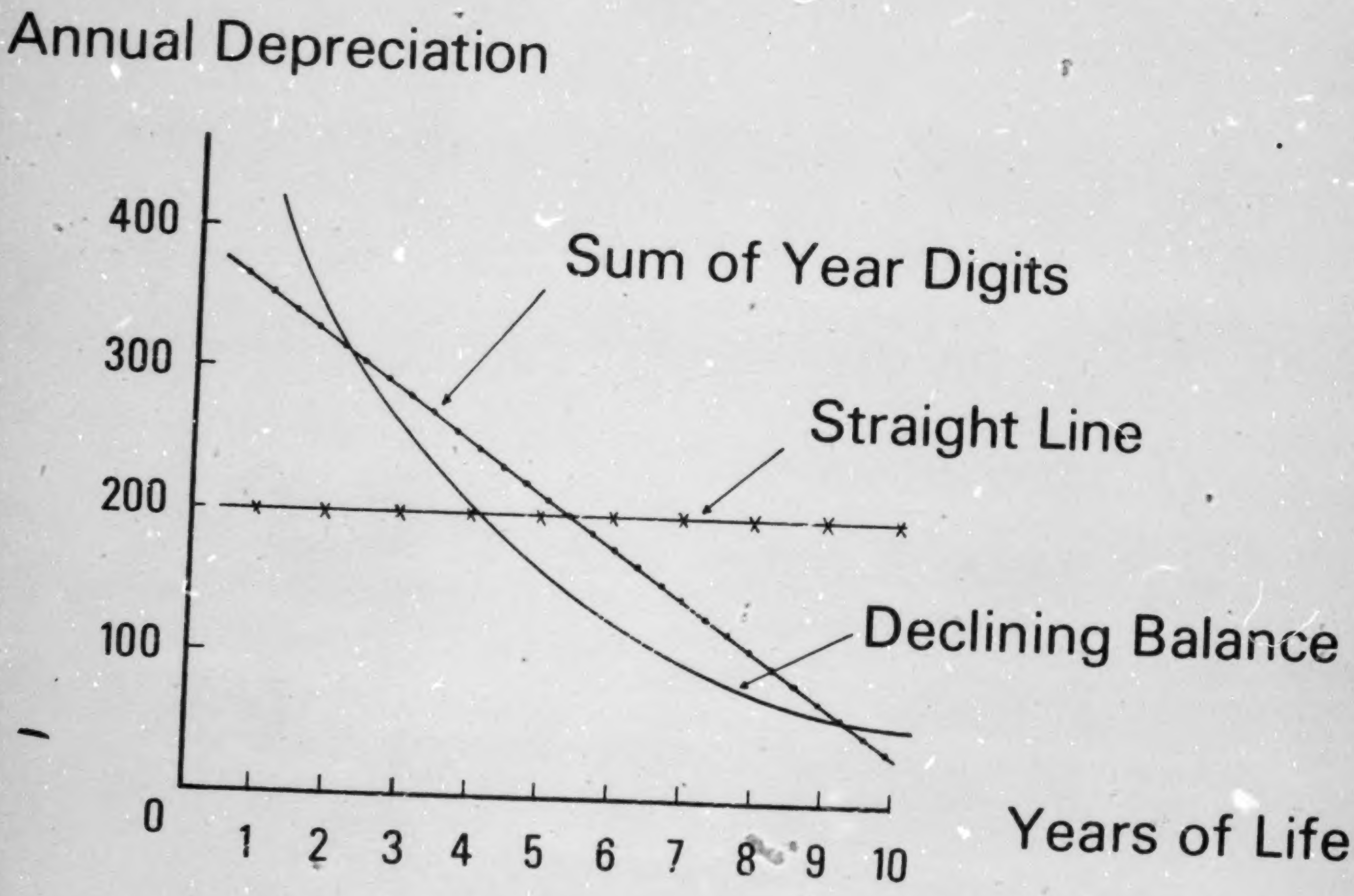
Kind of Property	Date Acquired	Cost	Depreciation allowed	Method of Deprec.	Rate % Life (yrs.)	Deprec. for yrs.	Balance
Hog Houses	1-8-63	$3200	$640	St. line	40 yrs	$80	$2480
	1-10-70	$2418	$806	Decl. Bal.	33 1/3% (6 yrs.)	$537.33	$1074.67
Total	----	$5618	$1446	----	----	$617.33	$3554.67

(NOTE: Machinery should be valued at original cost less depreciation allowable for the time it has been in use. The average life of farm machinery may be assumed to be 10 years, but this depends upon the kind of machine, its care and use.)

FEED-SEED-CROPS INVENTORY

Item	Beginning of Year			End of Year		
	Units	Value per unit	Total Value	Units	Value per unit	Total Value
Wheat	112 acres	$10	$1120	105	$12	$1260
Alfalfa	2000 bales	$1	$2000	100	$.80	$1260
Milo	10,000	$2	$200	40,000	$2.08	$832
Total	---	--	$3320	----	---	$2172

Comparison of Depreciation Methods



FARM RECORDS - FARM INVENTORIES
UNIT I

ASSIGNMENT SHEET #1--DETERMINING THE FRACTION TO USE WHEN APPLYING THE SUM-OF-THE-YEAR DIGIT METHOD OF DEPRECIATION

Work each of the problems listed below.

1. Determine the denominator for an asset that has eight year life.

2. What fraction would be used for the first year of an asset having an eight year life.

3. What fraction would be used for the fourth year of an asset having a five year life.

FARM RECORDS - FARM INVENTORIES
UNIT I

ASSIGNMENT SHEET #2--CALCULATING DEPRECIATION

Work each of the problems listed below.

1. Use the straight line method to calculate the annual depreciation for a $1100.00 trailer that has an expected life of ten years and projected salvage value of $200.00 at the end of this period.

2. Using the same problem as above calculate the depreciation for each year of service using the diminishing balance method. Use 20% as the annual depreciation.

Value at Beginning of Year	Annual Depreciation	Remaining Balance
1st year		
2nd year		
3rd year		
4th year		
5th year		
6th year		
7th year		
8th year		
9th year		
10th year		

3. Use the sum-of-the-digit method to calculate the depreciation for a $1100.00 asset with a 10 year life and a salvage value of $200.00.

Value at Beginning of Year	Annual Depreciation	Remaining Balance
1st year		
2nd year		
3rd year		
4th year		

ASSIGNMENT SHEET #2

5th year		
6th year		
7th year		
8th year		
9th year		
10th year		

FARM RECORDS - FARM INVENTORIES
UNIT I

ASSIGNMENT SHEET #3-CONSTRUCTING A FARM INVENTORY

Using the information below, calculate the depreciation, determine the present value, and construct a beginning inventory for this assimulated farm.

1. Twenty-seven beef cows averaging 1000 pounds
2. Twelve steer calves averaging 400 pounds
3. Thirteen heifer calves averaging 350 pounds
4. One registered bull
    a. Original cost $750.00
    b. Expected usage 4 years
    c. Number of years in use-2 years
    d. Salvage value $480.00
5. One hundred feeder pigs
    a. Weight 50 pounds
    b. Value = 1.5 x present market
6. Milo grain
    a. Fifty thousand pounds
    b. Use present market value
7. Alfalfa hay
    a. Five hundred bales at 80 pounds each
    b. Use present market value
8. Tractor (use declining balance)
    a. Original cost $3,000.00
    b. Two years old
    c. Expected life 10 years
    d. Salvage value $1,200.00

ASSIGNMENT SHEET #3

9. One chisel plow (use straight line)
   - a. Original cost $800.00
   - b. Four years old
   - c. Expected life of 10 years
   - d. Salvage value $100.00
10. One grain drill (use straight line)
    - a. Original cost $750.00
    - b. Five years old
    - c. Expected life 10 years
    - d. Salvage value $200.00
11. One portable grinder-mixer (use straight line)
    - a. Original cost $1600.00
    - b. One year old
    - c. Expected life 8 years
    - d. Salvage value $500.00
12. Sixteen foot stock trailer (use straight line)
    - a. Original cost $700.00
    - b. Two years old
    - c. Expected life 8 years
    - d. Salvage value $300.00
13. Three quarter ton truck (use sum of digits)
    - a. Original cost $3000.00
    - b. Two years old
    - c. Expected life 8 years
    - d. Salvage value $300.00

ASSIGNMENT SHEET #3

14. Two hog feeders (use straight line)
    - a. Original cost $300.00
    - b. Expected life 15 years
    - c. Three years old
    - d. Salvage value $0

15. Metal barn
    - a. Replacement cost $6000.00
    - b. Depreciation prior to this year $1800.00
    - c. Depreciation this year $200.00

    (NOTE: student has had practice figuring depreciation problems so these values are given for straight line method with barn for 30 years and hog house for 25 years)

16. Hog houses
    - a. Replacement cost $1000.00
    - b. Prior years depreciation $160.00
    - c. This years depreciation $40.00

17. Six thousand bushels of wheat stored under government loan
    - a. Wheat will not be bought back
    - b. Wheat has already been entered as a receipt for this year

18. Land
    - a. Owned-160 acres of cropland at $400.00 per acre
    - b. Rented-240 acres of rangeland

ASSIGNMENT SHEET NO. 3

THIS RECORD BELONGS TO

Name ______________________________

Address ______________________________

County ______________________________

For Year Beginning ______________________________

INVENTORY OF LAND

Owned or Rented	Cropland Inc. Meadow & Rotated	Pasture and Range Land	Woodland	Other	Total Land	
	Acres	Acres	Acres	Acres	Acres	Total Value
Owned Land (1)						
Rented Land (2)						
Rented Land (2)						
Total						

FARM IMPROVEMENTS

Kind of Improvement	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (Yrs.)	Depreciation For This Year	Balance
Total							

SAMPLE FORM - FARM IMPROVEMENTS

Kind of Improvement	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (Yrs.)	Depreciation For This Year	Balance
Barn Metal	X	$6,000	$1,800	X	X	$200	$4,000
Total	XXX			XXX			

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ASSIGNMENT SHEET #3

MACHINERY AND EQUIPMENT INVENTORY

Kind of Property	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (Years)	Depreciation For This Year	Balance
Total							

NOTE: Machinery should be valued at original cost less depreciation allowable for the time it has been in use. The average life of farm machinery may be assumed to be 10 years, but this depends upon the kind of machine, its care and use.

LIVESTOCK INVENTORY

Description	Beginning of Year			End of Year			Number Died or Slaughtered
	No.	Avg. Weight	Total Value	No.	Avg. Weight	Total Value	
Total							
Total							

FEED--SEED--CROPS INVENTORY

Item	Beginning of Year			End of Year		
	Units	Value per Unit	Total Value	Units	Value per Unit	Total Value
Total						

FARM RECORDS - FARM INVENTORIES
UNIT 1

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36
2. 8/36
3. 2/15

Assignment Sheet #2

1. $1100 minus 200 = 900 :- 10 years = $90 depreciation per year

2.

Value at Beginning Year		Annual Depreciation	Remaining Balance
1st Yr.	$1,100.00	20% X $1,100.00 = $220.00	$880.00
2nd Yr.	880.00	20% X $880.00 = $176.00	704.00
3rd Yr.	704.00	20% X $704.00 = $140.80	563.20
4th Yr.	563.20	20% X $563.20 = $112.64	450.56
5th Yr.	450.56	20% X $450.56 = $ 90.11	360.45
6th Yr.	360.45	20% X $360.45 = $ 72.09	288.36
7th Yr.	288.36	20% X $288.36 = $ 57.67	230.69
8th Yr.	230.69	20% X $230.69 = $ 46.14	184.55
9th Yr.	184.55	20% X $184.55 = $ 36.91	147.64
10th Yr.	147.64	20% X $147.64 = $ 29.53	118.11

3.

Value at Beginning of Year		Annual Depreciation	Remaining Balance
1st Yr.	$1,100.00	10/55 X (1,100-200) = 163.63	$936.37
2nd Yr.	836.37	9/55 X 900 = 147.27	789.10
	689.10	8/55 X 900 = 130.90	658.20
	558.20	7/55 X 900 = 114.54	543.66
	443.66	6/55 X 900 = 98.18	445.48
	345.48	5/55 X 900 = 81.82	363.66
	263.66	4/55 X 900 = 65.44	298.22
	198.22	3/55 X 900 = 49.09	249.13
	149.13	2/55 X 900 = 32.73	216.40
	116.40	1/55 X 900 = 16.36	200.04

ANSWERS TO THE ASSIGNMENT SHEETS

THIS RECORD BELONGS TO

ASSIGNMENT SHEET #3

Name ______________________

Address ______________________

County ______________________

For Year Beginning ______________________

INVENTORY OF LAND

Owned or Rented	Cropland Inc. Meadow & Rotated Pasture	Pasture and Range Land	Woodland	Other	Total Land	
	Acres	Acres	Acres	Acres	Acres	Total Value
Owned Land (1)	160				160	$\$64,000^{00}$
Rented Land (2)		240			240	
Rented Land (2)						
Total	160	240			400	$\$64,000^{00}$

FARM IMPROVEMENTS

Kind of Improvement	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (Years)	Depreciation For This Year	Balance
Barn Metal	X	Replacement 6000	1800	X	X	200	4000
Hog House	X	Replacement 1000	160	X	X	40	800
Total	XXX			XXX	XXX		

MACHINERY AND EQUIPMENT INVENTORY

Kind of Property	Date Acquired	Cost	Depreciation Allowed	Method of Depreciation	Rate % Life (Years)	Depreciation For This Year	Balance
Tractor	2 yrs. old	$\$8000^{00}$	$\$1600^{00}$	Dcl. Bal.	20% 10 yrs.	$\$1280^{00}$	$\$5120^{00}$
Chisel Plow	4 yrs. old	800^{00}	210^{00}	Sl. Line	10 yrs.	70^{00}	520^{00}
Grain Drill	5 yrs. old	750^{00}	220^{00}	Sl. Line	10 yrs.	55^{00}	475^{00}
Feed Grinder-Mixer	1 yr. old	1600^{00}	0	St. Line	8 yrs.	137^{50}	1462^{50}
Lv'Stock Trailer	2 yrs. old	700^{00}	50^{00}	Sl. Line	8 yrs.	50^{00}	600^{00}
3/4 Ton Truck	2 yrs. old	3000^{00}	667^{00}	Sum of the digits	5 yrs.	500^{00}	1833^{00}
2 Hay feeders	3 yrs. old	300^{00}	40^{00}	Sl. Line	15 yrs.	20^{00}	240^{00}
Total	XXX			XXX	XXX		

(NOTE: Method of depreciation is optional -- Method should most nearly approximate the loss in value of the asset.)

ANSWERS TO ASSIGNMENTS SHEETS

LIVESTOCK INVENTORY

Description	Beginning of Year			End of Year			Number Died or Slaughtered
	No.	Avg. Weight	Total Value	No.	Avg. Weight	Total Value	
Cattle: Beef Cows	27	1000#	- Present Mkt. Value				
Steer Calves	12	400#	- Present Mkt. Value				
Heifer Calves	13	350#	- Present Mkt. Value				
Registered Bull	1	(750.00 - 135.00)	$615.00				
Total		XXX			XXX		
Swine: Feeder Pigs	100	50#	- Present Mkt. Value				
Total		XXX			XXX		

FEED-SEED-CROPS INVENTORY

Item	Beginning of Year			End of Year		
	Units	Value per Unit	Total Value	Units	Value per Unit	Total Value
Milo Grain	50000#	(Present Mkt.)				
Alfalfa	20 Tons	(Present Mkt.)				
Total	XXX	XXX		XXX	XXX	

(NOTE: 6000 bu. wheat has been entered as a receipt, will not appear on inventory.)

FARM RECORDS - FARM INVENTORIES
UNIT I

TEST

1. Match the terms on the right with the correct definition.

_____a. Decline in value of an asset due to such causes as wear and tear, action of elements, obsolescence, and inadequacy

_____b. Any item of value owned

_____c. An itemized list of goods or valuables with their estimated worth

_____d. Process for placing a value on an asset based on its future earning power and the expected interest rate

1. Inventory
2. Depreciation
3. Capitalization
4. Asset

2. Select from the list below the general requirements that all inventories must include by placing an "X" in the blank.

_____a. Unit price

_____b. Method of depreciation

_____c. Unit

_____d. Quantity

_____e. Expected life

_____f. Breed

_____g. Name of asset

3. List four factors that determine the time of year to inventory.

a.

b.

c.

d.

4. Match the method of valuation on the right with the assets on the left.

_____a. Livestock produced for market
_____b. Machinery and breeding livestock
_____c. Purchased farm supplies
_____d. Long-lived buildings
_____e. Land, or bonds, or livestock that gain in value

1. Net selling price
2. Capitalization of earning power
3. Cost less depreciation
4. Replacement cost minus depreciation
5. Cost or market price (whichever is lower)

5. Discuss in writing two methods to handle crops under government loan on a inventory.

6. Match the method of computing depreciation on the right with the proper definition.

_____a. A fixed rate of depreciation is used every year and applies to the value of the asset at the beginning of the year
_____b. Yearly depreciation consists of dividing the total anticipated depreciation by the number of years asset is expected to last
_____c. The annual depreciation is determined by multiplying a fraction times the amount to be depreciated

1. Straight line
2. Diminishing balance
3. Sum-of-the year-digit method

7. What fraction would be used in the sum-of-the-digit method for the first year depreciation of an asset having a six year expected life?

8. Using three different methods, calculate the first year depreciation for a $1000.00 asset having a 10 year expected life and a $200.00 salvage value.

a. Straight line method

b. Diminishing balance method-Depreciation rate is twenty percent

c. Sum-of-the-year-digit method

9. Name two factors that determine the method of depreciation to use.

   a.

   b.

10. Select from the list below the items that are normally depreciated by circling the correct letters.

    a. Rent house

    b. Barn

    c. Fences

    d. Land

    e. Feeder cattle

11. Demonstrate the ability to construct a farm inventory when given the kind and number of assets for a simulated farm.

    (NOTE: If this activity has not been accomplished prior to this test, ask the instructor when this is to be completed.)

FARM RECORDS - FARM INVENTORIES
UNIT I

ANSWERS TO TEST

1. a. 2

   b. 4

   c. 1

   d. 3

2. a

   c

   d

   g

3. Any four of the following:

   a. Date when farm work begins for year's crop

   b. Date tenant moved to farm

   c. Date of lease renewal

   d. Date livestock shifted from winter feed to summer pasture

   e. If only enterprise was "feeding," inventory might be "between lots"

   f. Desirable when there is little else to do

   g. Period when there is small quantity of assets

   h. January 1 on general farms is most convenient because of tax purposes

4. a. 1

   b. 3

   c. 5

   d. 4

   e. 2

5. Discussion should include the following:

   a. Crops produced during year that have been entered as a receipt should not be inventoried as an asset

   b. If loan has not been entered as receipt, the government loan stock should be included on inventory

6. a. 2

   b. 1

   c. 3

7. 6/21

8. a. $1,000 - $200 = $800 divided by 10 = $80.00

   b. 20% X $1000 = $200.00

   c. 10/55 X ($1000 - $200) = $145.45

9. a. Method that most nearly approximates the loss in value of the asset

   b. Method easiest to compute

10. a

    b

    c

11. Performance skills will be evaluated to the satisfaction of the instructor.

FARM RECORDS-NET WORTH STATEMENT
UNIT II

TERMINAL OBJECTIVES

After completion of Unit II, the student should be able to match the various type assets and liabilities when given the definitions and demonstrate the ability to complete a net worth statement. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with net worth statements when given the definitions.
2. List the minimum core of financial records required in a well managed business.
3. Select the equations for calculating net worth.
4. Match the type of asset with the proper definition.
5. Classify assets into current, intermediate, and long-term when given examples.
6. Match the kind of liability with the proper definition.
7. Select from a list the uses made of a net worth statement.
8. Complete a net worth statement.

FARM RECORDS - NET WORTH STATEMENT
UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet
4. Take test

INSTRUCTIONAL MATERIALS

Provided in this unit:

1. Objectives
2. Information sheet
3. Transparency Master
   TM 1 - Net Worth Statement
4. Assignment sheets:
   #1 - Completing a Net Worth Statement
5. Answers to assignment sheet
6. Test
7. Answers to test

References:

1. Hopkins, John A. and Earl O. Heady. Farm Records and Accounting. Ames, Iowa: Iowa State University Press, 1962.

2. Castle, Emery N. and Manning H. Becker. Farm Business Management. New York: The Macmillan Company, 1967.

3. OSU Extension Facts. Financial Records: The Net Worth Statement. Extension Service, Oklahoma State University, Stillwater, Oklahoma.

4. Supervised Training Record Book. Curriculum and Instructional Materials Center, Stillwater, Oklahoma, 1973.

FARM RECORDS-NET WORTH STATEMENT
(also known as progress report)
UNIT II

INFORMATION SHEET

I. Terms and definitions

   A. Net worth-Statement listing the physical resources and liabilities of the business (Transparency 1)

   B. Assets-Items or resources owned

   C. Liabilities-Financial claims against the firm

   D. Working capital-Current assets minus current liabilities

   E. Spread sheet-Summarized net worth statement including information for several years

   F. Cash flow-Illustrates the gross flow of the requirements for cash throughout the year

II. Financial records required in business

   A. Net worth statement or balance sheet

   B. Profit and loss statement

   C. Projected cash flow

III. Equation for calculating net worth

   A. Net worth (equity) = Assets minus liabilities

   B. Assets = Liabilities plus net worth

IV. Type of assets

   A. Current assets-Generally include cash and other items which can rapidly be converted into cash at little or no loss in value

   B. Intermediate or working assets-Items that are less marketable and less readily converted into cash without loss

   C. Fixed or long-term assets-Not easily converted into cash and represent a relatively permanent investment

INFORMATION SHEET

V. Assets

   A. Current

      1. Savings

      2. Marketable securities

      3. Accounts receivable

      4. Livestock held for resale

      5. Marketable inventories of crops and supplies

   B. Intermediate

      1. Machinery and equipment

      2. Breeding stock

      3. Supplies not having ready market

   C. Long-term

      1. Buildings

      2. Land

VI. Kinds of liabilities

   A. Current-Debt obligations falling due within the next year

   Examples: 1. Accounts payable

      2. Short-term loans coming due

      3. Current payments due on long or intermediate term obligations

   B. Intermediate-Debt obligations coming due in a two through seven year period

   (NOTE: This classification includes loans to finance intermediate term assets such as breeding stock and machinery, and supplies requiring longer than one year repayment period.)

INFORMATION SHEET

C. Long-term-Loans to finance long-term or fixed assets

Examples: 1. Debts secured by real estate

2. Real estate improvements with repayment terms running from eight to forty years

VII. Uses made of a net worth statement

A. Measures performance in terms of growth

(NOTE: For this reason it is necessary to fill out a net worth statement about the same time each year.)

B. Shows the financial soundness of the business

(NOTE: A measure reflecting financial soundness is the percentage of equity; for example, every dollar of assets in a business having eighty percent equity is supported by eighty cents of equity and twenty cents of debt.)

C. Shows liquidity and the anticipated sources of working capital

(NOTE: Current assets - current liabilities = working capital)

D. Used in acquiring credit for working capital or capital expansion

(NOTE: The net worth statement shows what collateral is available to support these loan requests.)

Net Worth Statement

ASSETS	BEGINNING-1/1/72	ENDING-1/1/73
FIXED ASSETS		
Land	$190,900	$190,900
Bldgs., etc.	30,000	29,250
WORKING ASSETS		
Tractor	4,550	4,225
CURRENT ASSETS		
Livestock	1,500	1,500
Cash	1,000	1,000
Accounts receivable	400	400
TOTAL ASSETS	228,350	227,275
LIABILITIES		
LONG-TERM	28,000	26,500
INTERMEDIATE	200	200
CURRENT		
Unpaid bills	50	50
TOTAL LIABILITIES	28,250	26,750
NETWORTH (ASSETS-LIABILITIES)	200,100	200,525

ASSIGNMENT SHEET #1-COMPLETING A NET WORTH STATEMENT

Using the information provided, complete a beginning net worth statement for this assimulated farm.

1. Steer calves
    a. Weight-400 pounds
    b. Value-40¢ per pound
    c. Number units-30 head
2. Feeder pigs
    a. Number units-80 head
    b. Weight-40 pounds
    c. Value-40¢ per pound
3. Milo grain
    a. Number units-50,000
    b. Value-$2.00 per cwt.
4. Tractor
    a. Original cost-$7,500.00
    b. Five years old
    c. Expected life-10 years
    d. Salvage value-$1,000.00
    e. Present value-$4,250.00
5. Metal barn
    a. Replacement cost-$6,000.00
    b. Ten years old
    c. Amount previously depreciated-$3,000.00
6. Accounts payable $1,100.00

ASSIGNMENT SHEET #1

7. Interest due
    a. Six months
    b. Amount owed-$1,100.00
    c. Interest rate-8%
8. Land
    a. Forty acres
    b. Value-$200.00 per acre

ASSIGNMENT SHEET #1

OPERATOR'S NET WORTH STATEMENT

ASSETS: (Property owned and other resources)	Jan. 1, 19__	Jan 1 one year later
1. Land		$
2. Improvements		
3. Machinery and Equipment		
4. Hogs		
5. Cattie		
6. Feed, seed, and growing crops		
7. Accounts Receivable		
8. Cash on hand in Bank		
9. Stocks and bonds		
10. Cash Value Life Insurance		
11. Other Property		
TOTAL ASSETS		$
LIABILITIES: (Debts)		
12. Accounts Payable		
13. Mortages		
14. Interest Due		
15. Taxes Due		
TOTAL LIABILITIES		$
NET WORTH (Assets minus Liabilities)		$

FARM RECORDS - NET WORTH STATEMENT
UNIT II

ANSWERS TO ASSIGNMENT SHEET #1

OPERATOR'S NET WORTH STATEMENT

ASSETS: (Property owned and other resources)	Jan. 1, 19__	Jan. 1 one year later
1. Land	$8,000.00	$
2. Improvements	(6,000 - 3,000) 3,000.00	
3. Machinery and Equipment	(7,500 - 3,250) 4,250.00	
4. Hogs	1,280.00	
5. Cattle	4,800.00	
6. Feed, seed, and growing crops	1,000.00	
7. Accounts Receivable		
8. Cash on hand in Bank		
9. Stocks and bonds		
10. Cash Value Life Insurance		
11. Other Property		
TOTAL ASSETS	$22,330.00	$
LIABILITIES: (Debts)		
12. Accounts Payable	$1,100.00	
13. Mortagages		
14. Interest Due		
15. Taxes Due		
TOTAL LIABILITIES	$1,144.00	$
NET WORTH (Assets minus Liabilities)	$21,186.00	$

FARM RECORDS-NET WORTH STATEMENT
UNIT II

TEST

1. Match the terms on the right with the proper definition.

_____a. Items or resources owned

_____b. Statement listing the physical resources and liabilities of the business

_____c. Financial claims against the firm

_____d. Summarized net worth statement including information for several years

_____e. Current assets minus current liabilities

_____f. Illustrates the gross flow of the requirements for cash throughout the year

1. Spread sheet
2. Liabilities
3. Assets
4. Net worth
5. Working capital
6. Cash flow

2. List the minimum core of financial records required in a well managed business.

a.

b.

c.

3. From the list below, select the two equations for calculating net worth.

a. Assets = Liabilities plus net worth

b. Liabilities = Assets plus net worth

c. Net worth = Equity plus liabilities

d. Net worth (equity) = Assets minus liabilities

4. Match the type of asset on the right with the proper definition.

_____a. Items that are less marketable and less readily converted into cash without loss.

_____b. Generally include cash and other items which can rapidly be converted into cash at little or no loss in value

_____c. Not easily converted into cash and represent a relatively permanent investment

1. Current assets
2. Intermediate or working assets
3. Fixed or long-term assets

5. Classify the following assets as current, intermediate, or long-term. Place a "C", "I", or "L" in the blank preceding the assets depending on the type asset it represents.

_____a. Buildings

_____b. Supplies not having ready market

_____c. Land

_____d. Breeding stock

_____e. Machinery and equipment

_____f. Livestock held for resale

_____g. Marketable inventories of crops and supplies

_____h. Accounts receivable

_____i. Marketable securities

_____j. Savings

"C" Current assets

"I" Intermediate assets

"L" Long-term assets

6. Match the kind of liability on the right with the proper definition.

_____a. Debt obligations coming due in a two through seven year period

_____b. Debt obligations falling due within the next year

_____c. Loans to finance long-term or fixed assets

1. Current
2. Intermediate
3. Long-term

7. Select from the list below the uses made of a net worth statement. Place an "X" by the correct answers.

_____a. Shows the financial soundness of the business

_____b. Measures financial soundness in the percentage of assets

_____c. Shows liquidity and the anticipated sources of working capital

_____d. Measures performance in terms of growth

_____e. Shows the cash flow and requirements throughout the year

_____f. Used in acquiring credit for working capital or capital expansion

8. Complete a net worth statement.

FARM RECORDS-NET WORTH STATEMENT
UNIT II

ANSWERS TO TEST

1. a. 3
   b. 4
   c. 2
   d. 1
   e. 5
   f. 6
2. a. Net worth statement or balance sheet
   b. Profit and loss statement
   c. Projected cash flow
3. a
   d
4. a. 2
   b. 1
   c. 3
5. a. L
   b. I
   c. L
   d. I
   e. I
   f. C
   g. C
   h. C
   i. C
   j. C

FINANCING THE FARM BUSINESS-SOURCES OF CREDIT
UNIT III

TERMINAL OBJECTIVES

After completion of Unit III, the student should be able to match the type of interest with the proper explanation and calculate interest when given a problem and a formula. The student should be able to match the common sources of farm credit with the advantages and disadvantages of each source of credit. This knowledge will be evidenced by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with farm finance when given the definitions.
2. Select the type of loans when given the proper definition of each.
3. Match the type of interest with the proper explanation and work problems illustrating each.
4. List the factors that determine the rate of interest.
5. Calculate the annual interest when given a problem and a formula.
6. Match the source of credit when given a list of advantages and disadvantages of each source.
7. Select factors to consider in choosing a source of credit.

FINANCING THE FARM BUSINESS-SOURCES OF CREDIT
UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheet
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test
6. Secure chart for determining compound interest

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet
4. Take test

INSTRUCTIONAL MATERIALS

Provided in this unit:

1. Objectives
2. Information sheet
3. Assignment sheet
    #1--Calculating Interest
4. Answers to assignment sheet
5. Test
6. Answers to test

References:

1. Nelson, Aaron G., and William G. Murray. Agriculture Finance. Ames, Iowa: Iowa State University Press, 1967.
2. KSU Extension, Credit-Sources, Costs, Contracts, Pitfalls xc-480, Extension Service, Kansas State University, Manhattan Kansas.
3. Castle, Emery N., and Manning H. Becker. Farm Business Management, New York: The Macmillan Company, 1967.
4. Financing Modern Agriculture. Farm Credit Banks of Wichita.

(NOTE: Financing modern agriculture transparencies are available upon request.)

FINANCING THE FARM BUSINESS--SOURCES OF CREDIT
UNIT III

INFORMATION SHEET

I. Terms and definitions

   A. Appraisal--A fair market value given on personal property

   B. Collateral--Livestock, land, and other personal property used to secure the loan

   C. Amortized--Regular schedule of payment of the loan

   D. Interest rate--Percentage charged for the use of money borrowed.

   E. Maturity--Date the loan is to be paid in full

   F. Mortagages--A written claim listing the collateral to secure the loan

   G. Principle--Amount of money borrowed

II. Types of loans

   A. Long-term loans

      1. Extend for periods over seven years.
      2. Used for purchase of items such as land and large buildings.

   B. Intermediate loans

      1. Extend for periods one to seven years

      2. Used for purchase of machinery and equipment, the purchase of breeding herds and flocks, and construction or major repair of farm buildings

   C. Short-term loans

      1. Extend for periods up to one year

      2. Used for such items as fertilizer, feed or seed, or to pay other current operating expenses

INFORMATION SHEET

III. Types of interest

A. Compound interest-Interest calculated at regular intervals and added to the principle (compound interest is the same for savings as borrowing)

Example: Compound interest on a $100.00 loan with interest at 1 percent per month

Period	Beginning Balance	Chart Interest	Ending Balance
a. 1st Mo.	$100.00	$1.00	$101.00
b. 2nd Mo.	101.00	1.01	102.01
c. 3rd Mo.	102.00	1.02	103.03
d. 4th Mo.	103.03	1.03	104.06

B. Simple interest--Product of the principle, the time in years, and the annual rate of interest

Example: Interest on $1,200.00 for one year with the rate of interest at 6 percent per annum equals $72.00

C. Discounted interest--Interest is deducted from principle at time loan is made

Example:

a. $1,200.00 loan for one year discounted at 6 percent

b. Borrower would receive: $1,200.00 - $72.00 = $1,128.00

c. $1,200.00 would be paid at the end of the year

(NOTE: True annual interest would be 6.38 percent.)

D. Add-on-interest--Interest is calculated on the beginning balance and then added to principle to obtain the amount to be repaid in equal periodic installments

Example:

a. $1,200.00 installment plan loan @ 6 percent interest to be repaid in 12 equal monthly payments

INFORMATION SHEET

b. $1,200.00 x 6% = $72.00

c. $1,200 + $72.00 = $1,272 divided by 12 months = $106.00 payment

(NOTE: Interest is being paid on unowed money, true annual rate is 11.07%)

IV. Factors that determine credit charges

A. Cost of money in the money market

B. Service cost of making records, keeping records, and collecting loans

(NOTE: Service charges may be a separate cost.)

C. Risk of loss

V. Calculating interest rates

$$\frac{\text{Total of Finance Charges}}{\text{1/2 Original Loan}} \times \frac{\text{No. of Payments}}{\text{No. of Years}} \times \frac{1}{\text{No. of Payments Plus 1}} = \text{True Annual Rate of Interest}$$

Example: A farmer borrowed $8,000.00 which cost him $400.00 for 24 months. What was his interest rate?

$$\frac{400}{4,000} \times \frac{24}{2} \times \frac{1}{25} = 4.8\% \text{ Interest}$$

VI. Advantages and disadvantages of credit sources

A. Commercial banks

1. Advantages

a. Convenience of borrowing

INFORMATION SHEET

- b. Know personal needs
- c. Loan approved quickly
- d. Loans on more diversified items
- e. Will make character loans

2. Disadvantages
   - a. Interest rate usually higher
   - b. Short-term loans
   - c. Will not loan as much on land as some agencies

B. Individuals

1. Advantages
   - a. Low rate of interest
   - b. Immediate loan
   - c. Greater possibility to negotiate the payment or interest of loan
2. Disadvantages
   - a. Not dependable
   - b. Usually short-term credit

C. Finance companies

1. Advantages
   - a. Easier for poor risk persons
   - b. Immediate loan approval
   - c. Short-term loans
   - d. Convenience of borrowing
2. Disadvantages
   - a. Interest rates extremely high
   - b. Usually a straight line interest rate on a longer term
   - c. High pressure loan agents

INFORMATION SHEET

D. Federal land banks

  1. Advantages

    a. Usually have low interest rates on long-term loans

    b. Long-term loan (20-40 years)

    c. More understanding on economic conditions

  2. Disadvantages

    a. Complicated loan procedure

    b. Borrower has to buy shares

    c. Usually appraised value is low

    d. Limited funds to be loaned

E. Production credit association

  1. Advantages

    a. Low interest rate

    b. Unlimited funds

    c. Pay interest only on amount of time used

    d. Keeps better records

  2. Disadvantages

    a. Borrower has to buy shares

    b. Short-term loans

    c. Not conveniently located

F. Farmers' Home Administration

(NOTE: Check with county supervisor.)

  1. Advantages

    a. Makes loans to individuals who do not qualify for other loans

    b. Short, intermediate, and long-term loans

INFORMATION SHEET

- c. Reasonable rates and terms on loans
- d. Advice, assistance, and supervision given by instructor
- e. Special loans to youth available

2. Disadvantages
   - a. Not intended as a permanent source of financing
   - b. Borrowers expected to refinance when suitable commercial sources are available
   - c. Secure loans only on larger acreages

G. Insurance companies

1. Advantages
   - a. Long-term mortgages
   - b. Low interest rates
   - c. Not any limits on size of loan except for self-imposed limits
2. Disadvantages
   - a. First mortgages
   - b. Some states prohibit short-term loans
   - c. Selective about areas where loans are made
   - d. Can not pay loan back all at once

H. Merchants and dealers

1. Advantages
   - a. Easier for poor risk persons
   - b. Convenient for farmer
   - c. Immediate loan
   - d. Loan can be made for large percent of value
   - e. Repayment schedule may be designed for individual

INFORMATION SHEET

2. Disadvantages
    a. Interest is higher
    b. May have different form of credit arrangement for various customers (This could be an advantage.)

VII. Factors to consider in choosing a source of credit
- A. Amount of the loan
- B. Rate of interest
- C. Length of loan period
- D. Repayment schedules
- E. Size of payments
- F. Reliability of lending agents
- G. Additional credit charges

FINANCING THE FARM BUSINESS--SOURCES OF CREDIT
UNIT III

ASSIGNMENT SHEET #1--CALCULATING INTEREST

Answer the following problems:

1. How much interest would be paid for the use of $360.00 for one year at 8% straight interest?

2. How much interest would be paid for the use of $360.00 for 18 months at 8% straight interest?

3. How much compound interest would be paid for three month's use of $360.00 at 1% interest per month?

4. a. What would monthly payments be for one year's use of $360.00 to be repaid in 12 equal monthly payments using 8% add-on type interest?

   b. What would be the true annual interest rate for the above loan?

NOTE: $$\frac{\text{Total of Finance Charges}}{\text{1/2 Original Loan}} \times \frac{\text{No. of Payments}}{\text{No. of Years}} \times \frac{1}{\text{No. of Payments Plus 1}} = \text{True Annual Rate of Interest}$$

ASSIGNMENT SHEET #1

5. a. How much interest would be paid for one year's use of $360.00 to be repaid in 12 equal payments using 8% discount interest?

   b. What would be the true annual interest rate for the above loan?

   (NOTE: Use formula as stated in question 4.)

6. If a person borrows $2,000.00 for a car, pays $68.89 per month for 36 months. How much interest has he paid?

   What is the true annual interest rate for the above loan?

   (NOTE: Use formula as stated in question four.)

FINANCING THE FARM BUSINESS--SOURCES OF CREDIT
UNIT III

ANSWERS TO ASSIGNMENT SHEET #1

1. $360.00 X 8% = $28.80

2. $28.80 for 12 mo. + $14.40 for 6 mo. = $43.20

3. 1st mo. - 360 X 1% = 3.60 - Ending Balance = $363.60
   2nd mo. $363.60 X 1% = 3.64 - Ending Balance = $367.24
   3rd mo. $367.24 X 1% = 3.67 - Ending Balance = $370.91
   $10.91 interest

4. a. $360.00 X 8% = $28.80
   b. $\frac{\$28.80}{180} \times \frac{12}{1} \times \frac{1}{13} = 14.7\%$ true annual interest

5. a. $360.00 X 8% = $28.80 interest
   b. $\frac{\$28.80}{165.60} \times \frac{12}{1} \times 1/13 = 16.05\%$ true annual interest
   (NOTE: Since loan was discounted only $331.20 was amount of original loan.)

6. a. $68.80 X 36 = $2,480.04 - $2,000.00 = $480.04
   b. $\frac{\$480.04}{1{,}000} \times \frac{36}{3} \times 1/37 = 15.5\%$

FINANCING THE FARM BUSINESS--SOURCES OF CREDIT
UNIT III

TEST

1. Match the terms on the right to the correct definition.

_____a. Amount of money borrowed

_____b. A fair market value given on personal property

_____c. Livestock, land, and other personal property used to secure the loan

_____d. A written claim listing the collateral to secure the loan

_____e. Date the loan is to be paid in full

_____f. Percentage charged for the use of money borrowed.

_____g. Regular schedule of payment of the loan

1. Collateral
2. Appraisal
3. Amortized
4. Interest rate
5. Maturity
6. Mortagages
7. Principle

2. Select the type loan on the right when given the definitions on the left.

_____a.

1) Extend for periods of one to five years

2) Used for purchase of machinery and equipment, the purchase of breeding herds and flocks, and construction or major repair of farm buildings

_____b.

1) Extend from five to thirty years or more

2) Used for such purposes as the purchase of farms, for farm improvements, for major repairs and other purposes

1. Long-term loans
2. Intermediate loans
3. Short-term loans

_____c.

1) Extend for periods up to one year

2) Used for such items as fertilizer, feed or seed, or to pay other current operating expenses

3. Match the terms on the right to the correct definition.

_____a. Product of the principle, the time in years, and the annual rate of interest

_____b. Interest is deducted from principle at time loan is made

_____c. Interest calculated at regular intervals and added to the principle

_____d. Interest is calculated on the beginning balance and then added to principle to obtain the amount to be repaid in equal periodic installments

4. Work the following problems:

a. How much interest would be paid for the use of $100.00 for one year at 8% straight interest?

b. How much compound interest would be paid for two months use of $100.00 at 1% percent interest per month?

c. How much interest would be paid for one year's use of $100.00 to be repaid in 12 equal monthly payments using 8% add-on type interest?

d.

1) How much money would the borrower have available to spend when borrowing $100.00 to be repaid in 12 equal payments using 8% discount interest

2) What amount would monthly payments be in the above problem?

5. List two factors that determine the rate of interest and complete the problem below.

a.

1)

2)

b. A farmer borrowed $6,000 which cost him $400.00 for 24 months. Calculate the interest by using the following formula.

$$\frac{\text{Total of Finance Charges}}{\text{1/2 Original Loan}} \times \frac{\text{No. of Payments}}{\text{No. of Years}} \times \frac{1}{\text{No. of Payments Plus 1}} = \text{True Annual Rate of Interest}$$

6. Match the source of credit on the right with the proper list of advantages and disadvantages on the left.

_____a.

1) Advantages

a) Easier for poor risk persons

b) Convenient for farmer

c) Immediate loan

d) Loan can be made for large percent of value

e) Repayment schedule may be designed for individual

2) Disadvantages

a) Interest is higher

b) May have different form of credit arrangement for various customers (This could be an advantage.)

_____b.

1) Advantages

a) Makes loans to individuals who do not qualify for other loans

b) Short, intermediate, and long-term loans

c) Reasonable rates and terms on loans

d) Advice, assistance, and supervision given by supervisor

2) Disadvantages

a) Not intended as a permanent source of financing

b) Borrowers expected to refinance when suitable commercial sources are available

1. Commercial banks
2. Farmers' home administration
3. Federal land banks
4. Insurance companies
5. Production credit association
6. Merchants and dealers
7. Individuals
8. Finance companies

c) Secure loans only on larger acreages

_____c.

1) Advantages

a) Long-term mortgages

b) Low interest rates

c) Not any limits on size of loan except for self-imposed limits

2) Disadvantages

a) First mortgage loans

b) Some states prohibit short-term loans

c) Selective about areas where loans are made

d) Can not pay loan back all at once

_____d.

1) Advantages

a) Usually have low interest rates on long-term loans

b) Long-term loan (20-40 years)

c) More understanding on economic conditions

2) Disadvantages

a) Complicated loan procedure

b) Borrower has to buy shares

c) Usually appraised value is low

d) Limited funds to be loaned

1. Commercial banks
2. Farmers' home administration
3. Federal land banks
4. Insurance companies
5. Production credit association
6. Merchants and dealers
7. Individuals
8. Finance Companies

____e.

1) Advantages
    - a) Low interest rate
    - b) Unlimited funds
    - c) Pay interest only on amount of time used
    - d) Keeps better records

2) Disadvantages
    - a) Borrower has to buy shares
    - b) Short-term loans
    - c) Not conveniently located

____f.

1) Advantages
    - a) Convenience of borrowing
    - b) Know personal needs
    - c) Loan approved quickly
    - d) Loans on more diversified items
    - e) Will make character loans

2) Disadvantages
    - a) Interest rate usually higher
    - b) Short-term loans
    - c) Will not loan as much on land as some agencies

_____g.

1) Advantages

   a) Low rate of interest

   b) Immediate loan

   c) Greater possibility to negotiate the payment or interest of loan

2) Disadvantages

   a) Not dependable

   b) Usually short-term credit

_____h.

1) Advantages

   a) Easier for poor risk persons

   b) Immediate loan approval

   c) Short-term loans

   d) Convenience of borrowing

2) Disadvantages

   a) Interest rates extremely high

   b) Usually a straight line interest rate on a longer term

   c) High pressure loan agents

7. Select from the list below three factors to consider in choosing a source of credit. Check correct factors.

_____a. Time of year

_____b. Amount of the loan

_____c. Area of the state

_____d. Rate of amortizing

_____e. Repayments schedules

_____f. Size of payments

FINANCING THE FARM BUSINESS--SOURCES OF CREDIT
UNIT III

ANSWERS TO TEST

1. a. 7

   b. 2

   c. 1

   d. 6

   e. 5

   f. 4

   g. 3

2. a. 2

   b. 1

   c. 3

3. a. 1

   b. 3

   c. 2

   d. 4

4. a. $100.00 x 8% = $8.00

   b. First month $100.00 x 1% = $1.00 Ending balance $101.00

   Second month $101.00 x 1% = $1.01 Ending balance $102.01

   Total interest = $2.01

   c. $100.00 x 8% = $8.00

   d. 1) $100.00 x 8% - $100.00 - 8.00 = $92.00 amount borrower receives

   2) $100.00: 12 = $8.33 monthly payment

5. Any two of these three:

   a. 1) Cost of money in money market

   2) Service cost of making records, keeping records, and collecting loans

   3) Risk of loss

b. $\frac{400}{3000} \times \frac{24}{2} \times \frac{1}{25} = 6.4\%$

6. a. 6

   b. 2

   c. 4

   d. 3

   e. 5

   f. 1

   g. 7

   h. 8

7. b

   e

   f

INSURANCE
UNIT IV

TERMINAL OBJECTIVES

After the completion of Unit IV, the student should be able to match terms associated with insurance to the proper definition. He should be able to match the various types of liability, property, life, and health insurance when given the correct definition and to select from a list the factors that influence rates for various kinds of insurance. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with insurance to the proper definition.
2. Match the type liability insurance with the proper definition.
3. Match the basic auto coverages with the proper definition.
4. Interpret the liability limit of a 10-20-5 policy.
5. Select from a list the factors to consider when determining what coverages to buy for an automobile.
6. Select from a list those items that influence automobile insurance premiums.
7. List ways to save on automobile insurance.
8. Match the type property insurance with the correct definition.
9. Select from a list those items that influence cost of property insurance.
10. Name the basic rules to use when buying property insurance.
11. Distinguish between crop hail insurance and federal crop insurance.
12. Match the kind of life insurance policy with the characteristics of each kind.
13. Discuss in writing instances when a family income life insurance policy would be needed most.
14. Select from a list the factors that determine the amount of life insurance needed.

15. Match the kind of health insurance with the proper definition.

16. Select from a list the features of workmen's compensation insurance.

17. Select from a list the kinds of work covered by social security, and who must pay social security tax.

18. Select from a list the benefits which are paid from social security funds.

19. Select from a list the reasons social security payments may stop.

20. Evaluate a family insurance program and make recommendations for improvements.

INSURANCE
UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparency
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet
4. Take test

INSTRUCTIONAL MATERIALS

Provided in this unit:

1. Objectives
2. Information sheet
3. Transparency Master
   TM 1 - Social Security--Where the Money Comes From Where the Money Goes
4. Assignment sheets:
   #1 - Evaluating Your Family Insurance Program
5. Test
6. Answers to test

References:

1. A Teacher's Guide for Insurance: A Business and Office Curriculum Project. Department of Vocational Education, Colorado State University, Fort Collins, Colorado, 1971.

2. Kelsey-Daniels. Handbook of Life Insurance. Institute of Life Insurance, 277 Park Avenue, New York, 10017.

3. Your Social Security. Superintendent of Documents. U.S. Government Printing Office. Washington, D.C. 20402, 1970

4. Doane's Farm Management Guide

INSURANCE
UNIT IV

INFORMATION SHEET

I. Terms and definitions

A. Annuity--A contract that provides an income for a specified period of time such as a number of years or for life

B. Application--A statement of information made by a person applying for insurance

(NOTE: This becomes part of the policy.)

C. Automatic premium loan--A provision authorizing the premium to be subtracted from policy cash values if not paid by the end of the grace period

D. Beneficiary--Person named in the policy to receive proceeds at death of insured

E. Cash value--Amount available in cash upon voluntary termination of policy before death

F. Convertible--Term insurance exchanged at option of policyholder without evidence of insurability for another insurance plan

G. Disability benefit (Waiver of premium)--The provision added to life insurance to pay premiums if totally and permanently disabled

H. Double indemnity--An accidental death benefit to pay double face amount in case of death by accident

I. Endowment insurance--Insurance payable to the insured if living on maturity date or death prior to maturity

J. Face amount--Amount stated on the face of the policy that will be paid in case of death or at maturity

K. Grace period--A period (usually 31 days following the premium due date during which a premium may be paid without a penalty)

(NOTE: This applies only to life insurance where stated and sometimes health insurance.)

L. Group insurance--Insurance which is usually issued without medical examination on a group of persons under a single master contract

M. Lapsed policy--A policy terminated for nonpayment of premium

INFORMATION SHEET

N. Policy--Document stating terms of contract that is issued to policyholder by the company

O. Policy dividend--A refund of part of the premium on participating policies plus interest

P. Policy loan--Cash loaned on the cash value of policy at a specified interest rate

Q. Premium--The payment or consideration one makes as a policyholder in agreement with the policy for insurance

R. Insurance--Spreads the risk of one person's misfortune among a large number of persons

S. Family income life insurance--A combination of permanent life insurance and decreasing term insurance

T. Homeowner's policy--A combination of several coverages or protections in one policy regarding home, personal property, and liability insurance

U. Credit insurance--Written through lending institutions on lives of borrowers

V. Permanent life insurance--Includes straight life, limited pay, and endowment

W. Term life insurance--Gives protection for a stated period of time and at the end of term is the termination of contract

Examples: 5 year term, 15 year term, decreasing term, or term to age 65

X. Liability--When one is negligent and therefore liable for injury or damage caused to someone else

(NOTE: Liability insurance protects one from claims made by other people and provides defense in the event of a groundless suit. Liability limits should be equal to assets.)

Y. Social security--Act of congress which provides retirement and disability income and is funded by social security tax

Z. Co-Insurance--When one is carrying part of the risk and is not fully insured

AA. No fault insurance--In regard to auto insurance, everyones company will pay for their own damage and injury

(NOTE: State laws may amend this concept.)

BB. Loss payable clause--Names the mortgage company on the policy whereby any claim is payable to mortgage company up to the amount of mortgage

INFORMATION SHEET

11. Types of liability insurance

A. Public liability--Protects policyholder from lawsuits by members of the public who suffer property or bodily injury caused by his negligence

(NOTE: This would apply to auto liability and farmer's comprehensive liability.)

B. Employer's liability--Protects employer when he is liable for on-the-job accidents caused by his negligence

(NOTE: This covers loss of time, medical care, bodily injury, sickness, and death.)

C. Workmen's compensation-Pays the employee's medical expense regardless of who is negligent

D. Farmer's comprehensive liability--Similar to public liability but is designed specifically for farmers

111. Basic automobile coverages

A. Bodily injury liability--Protects the policyholder financially if he or a member of his family injures someone while operating his vehicle

B. Property damage liability--Protects the policyholder financially if he or a member of his family damages someone's automobile or other property

(NOTE: Most policies also offer liability protection for one if driving a borrowed car, or if loaning one's car to someone else.)

C. Medical reimbursement--Pays for any medical, dental, hospital, nursing, or funeral expenses incurred as the result of an auto or truck accident involving the insured vehicle regardless of fault

D. Comprehensive physical damage--Insures auto against glass breakage, fire, theft, and all weather elements

E. Collision--Insurance pays for damage to one's car regardless of the burden of negligence

(NOTE: Deductible choice ranges from $10 to $250.)

F. Protection against the uninsured motorist--Coverage for holder to recover loss for bodily injury caused by a person having no liability insurance

IV. Interpretation of a 10-20-5 automobile policy

A. Ten indicates insured person is protected against damages up to $10,000 for one person

INFORMATION SHEET

B. Twenty means insured person is protected against damages up to $20,000 for two or more persons injured in one accident

(NOTE: This is not in addition to the $10,000 protection for one person.)

C. The five indicates insured person is protected against 5,000 property liabilty damage

(NOTE: It costs very little to raise liability limits. 100-300-100 costs as little as $10.00 more per year than 10-20-5.)

V. Factors to consider when determining types of automobile coverages to buy

A. Liability insurance should be purchased for every licensed vehicle

B. Liability limits should be the same on all vehicles

(NOTE: Minimum liability limits should be equal to one's assets.)

C. It is advisable to carry medical insurance on every vehicle

(NOTE: Medical payments cover passengers as well as the one insured and family.)

D. Consider dropping comprehensive and collision insurance when:

1. The car is paid for and there is no bank note
2. One can afford to repair the car from personal funds
3. One can do without the automobile if destroyed
4. The value of car is not more than the cost of comprehensive and collision premiums

(NOTE: All these factors should be considered and applied to each individual circumstance.)

V1. Items that influence automobile insurance premiums

A. Number of basic coverages one carries

B. Area one lives

C. Value and size of automobile

D. Age

E. Sex

(NOTE: Boys rates are higher than girls.)

INFORMATION SHEET

F. Marital status

G. Distance one drives to work

H. Use of car--Business or pleasure

I. Driving habits of individuals

J. Claims paid on policy during past three year period

K. Rates must be similar for equal risks

L. Cost of repairs

(NOTE: Rates are set by each insurance company, and the insurance commission regulates these rates.)

VII. Ways to save on automobile insurance

A. Safe driver discount

(NOTE: Some companies give a ten to twenty percent discount on basic premiums to those with a three year record of no involvement in accidents where they were at fault or convicted of traffic violations.)

B. Driver education discount

(NOTE: Discount varies from company to company, but the course must meet national standards and be successfully completed.)

C. Two or more cars discount

VIII. Types of property insurance

A. Fire and extended coverage--Protects dwellings, farm buildings, and personal property against the perils of fire, lightning, wind, hail, explosion, riot, and civil commotion

(NOTE: Property does not have to be owner occupied.)

B. Homeowners--A package policy generally for town property that insures the dwelling, additional private structures, personal property such as household goods, and comprehensive personal liability; to qualify for this policy, the dwelling must be owner occupied

(NOTE: Homeowners insures against damage from fire, and extended coverage as described in item A, plus theft, vehicle damage, falling objects, weight of ice and snow, freezing of plumbing system, and hot water heater rupture.)

INFORMATION SHEET

C. Farm owners-Same as homeowners plus optional coverages of farm barns and buildings, machinery, grain, hay, livestock, tools and equipment, and employer's liability

IX. Items that influence cost of property insurance

- A. Amount of protection
- B. Type of contruction (wood or brick)
- C. Location
- D. Distance from fire department
- E. Period of time covered

X. Basic rules for buying property insurance

- A. Do not insure if financially able to do without or to replace with personal funds or if a loss would not hamper the farm operation
- B. Insure if there is a loan against property under personal ownership
- C. Write enough coverage to replace the loss

XI. Crop hail and federal crop insurance

- A. Crop hail
    1. An insurance company policy that protects against loss by hail or fire; optional coverage is loss by wind
    2. The amount of loss payable is the amount of insurance multiplied by the percentage of damage
    3. Damage percentage is determined by sampling methods that are agreeable to both parties
- B. Federal crop insurance
    1. Provides "all risk" crop investment insurance
    2. Does not insure profit for the farmer or cover avoidable losses such as those caused by neglect or poor farming practices
    3. Pays up to the guaranteed yield

       (NOTE: If actual yield is as much as guarantee then no payment is made regardless of extent of loss.)

INFORMATION SHEET

XIII. Kind of life insurance policies

A. Term insurance

1. Covers the stated number of years of term that the policy is in effect
2. Usually does not accumulate any cash value
3. Insurance protection ends when the stated term expires
4. Used for business insurance protection, creditor's risk, and general family protection
5. For the time contracted, it is the cheapest form of life insurance
6. Chances of death increase with age, therefore policy rates are higher for each succeeding period
7. No guarantee of renewal
8. Group insurance is usually term insurance

B. Straight life insurance (Whole life or ordinary life)

1. Provides lifetime protection
2. Most widely used of all permanent life insurance
3. Costs less annually than any other kind of lifetime protection
4. Premiums are paid throughout the policyholder's lifetime
5. Policy accumulates a cash value
6. Policyholder may borrow the cash value of his policy

C. Limited payment life insurance

1. Provides lifetime protection
2. Premiums are paid only during a specified period of time
3. Fewer premioms are necessary so each one is larger
4. Accumulates cash value
5. Twenty year, or thirty year pay, or paid up at 65 are examples of limited payment life insurance

INFORMATION SHEET

(NOTE: Anyone having above average income for a few years might consider this type of insurance.)

D. Endowment life insurance

1. Policy puts emphasis on savings more than any other life insurance
2. Purpose is to accumulate a certain amount of money in a specified period, while providing life insurance
3. If policyholder lives, whole amount of policy is paid to him when endowment comes due
4. If policyholder dies before the period has elapsed, the full amount of the policy is paid to beneficiary
5. Expensive form of insurance for protection.
6. Suits those who wigh money for education children or during retirement

XIII. Instances when family income life insurance is needed most

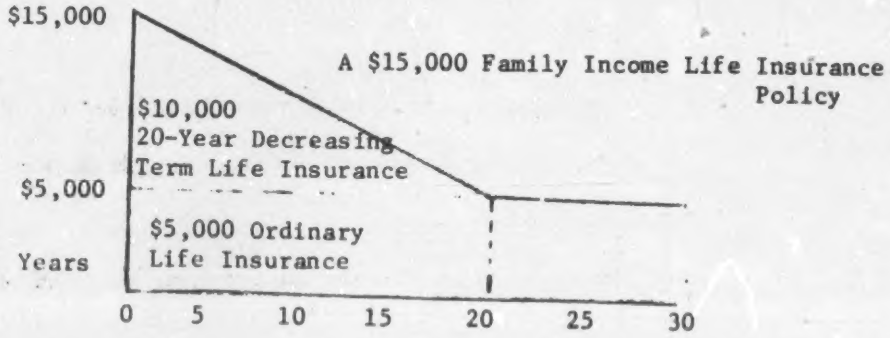
(NOTE: Combination of permanent life and decreasing term insurance.)

A. When there are small children to be reared or educated

B. While policyholder is paying off mortgage

Example: The chart below illustrates a common form of family income policy

(NOTE: If the policy shown had been in effect for fifteen years, the beneficiary would receive monthly income payments for the remaining five years of the policy.)



INFORMATION SHEET

XIV. Factors that determine amount of life insurance needed

A. Family's income and net worth

B. Size of the family

C. Age and sex of the children

D. Skills and abilities of the wife and older children

E. Indebtedness of the family

F. Long-time goals including college education for the children

(NOTE: A qualified insurance agent is able to program one's insurance needs. Know the insurance agent and have confidence in him. There is usually a need for revision of your insurance needs.)

XV. Kinds of health insurance

A. Hospital-surgical-medical

1. Known as first dollar coverage with a small deductible clause

   Example: $20, $50, or $100 deductible

2. Usually has specified limits on room and board, hospital special charges, surgery, and out patient care

B. Major medical

1. Pays for expenses associated with a catastrophe and has a large deductible clause of from $100 to $1,000 but has a large benefit limit

   Example: $10,000 to $20,000

2. Usually covers most all expenses over the deductible with possible a limit on room, board, and surgery

3. Has larger benefit period than hospital-surgical-medical

   Example: Three years

4. Major medical usually pays 80% for eligible expenses for the first one to five thousand dollars and 100% thereafter until maximum benefits are reached

INFORMATION SHEET

C. Disability income

1. Pays a stated amount while a person is disabled because of injury or illness

2. Deductibles on disability income are called waiting periods

   (NOTE: This is the period between the start of disability and beginning of payment.)

3. Has different combinations of waiting periods

   (NOTE: Example: 0/0 means no waiting period for accident or sickness, 30/90 means 30 day waiting period for accidents and 90 day waiting period for sickness.)

4. Variations in length of benefit periods may be purchased

   Example: Life time benefits for accidents and five year benefits for sickness

5. Usually there are smaller benefits for partial disability

(NOTE: The hospital-surgical-medical, major medical, and disability income policies can be purchased in group plans, individual plans, and family plans. Many employers of larger firms provide group plans for employees.)

XVI. Features of workmen's compensation

A. In effect in all states

B. Employer must insure employees

C. Covers injury on the job

D. Covers illness as a result of job

E. Pays percentage of earnings while disabled

F. Pays accidental death benefits

G. Protects the employer regardless of who is negligent

H. Applies usually to firms with four or more full time employees

(NOTE: Dairys and feedlots with three or more employees may come under workmen's compensation.)

INFORMATION SHEET

XVII. Kinds of work covered by social security

A. Almost every kind of employment and self employment

(NOTE: Some occupations are covered only if certain conditions are met.)

B. Self-employed farmers and ranchers

(NOTE: If net earnings from self-employment are $400 or more in a year)

C. Farm employees--Social security credits are earned while working for a farmer, a ranch operator, or a farm labor crew leader

1. If the employer pays $150 or more in cash during the year for farm work
2. If farm work for the employer involves twenty or more days during the year for cash wages

XVIII. Benefits paid from social security (Transparency 1)

A. Monthly retirement benefits--Payable in full at age 65 with reduced benefits as early as age 62

B. Monthly survivor's benefits are payable to the following:

1. Widow at 62
2. Unmarried children under 18 (Under 22, if full-time student)
3. Children 18 or over if disabled before age 18
4. Widow at any age if she is caring for child under 18
5. Widow as early as age 50 if she has a severe disability
6. Dependent parents 62 or over
7. Dependent widower 62 or over

C. Monthly disability benefits--Payable to one before 65 with a severe disability that has lasted at least 12 months

D. Medicare--A two-part health insurance program for older people

E. Lump sum for funeral expenses payable to survivor at death of the person paying social security

INFORMATION SHEET

XIX. Reasons social security payments stop

A. Marriage to one who is not covered by social security insurance payments

(NOTE: An exception is for the widow who remarries after reaching age 60.)

B. Divorce--All payments end if divorce is granted unless one is age 62 or older or if the marriage lasted at least thirty continuous years

C. No child "in her care"--Payment to wife under 62 stops when she no longer has a child under 18 or disabled

D. Child reaches 18--Payments stop unless he is disabled or a full-time unmarried student

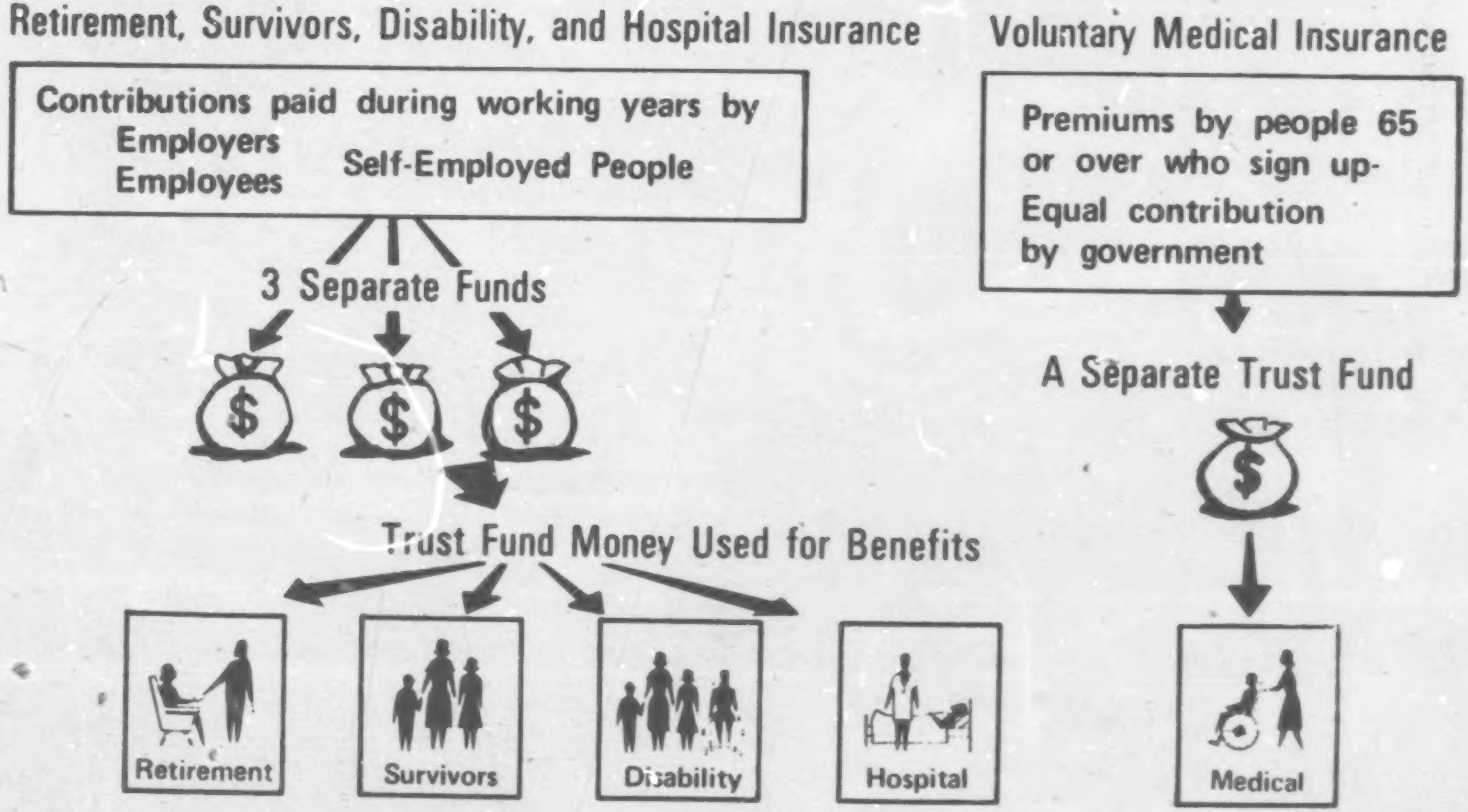
E. Adoption--Payments end unless person is adopted by stepparent, grandparent, aunt, uncle, brother, or sister

F. Death--Applies to any person receiving monthly benefits

G. Disability--If no longer disabled, payments stop to dependents

SOCIAL SECURITY

Where the Money Comes From, Where the Money Goes



Retirement, Survivors, Disability, and Hospital Insurance

Contributions paid during working years by
Employers
Employees
Self-Employed People

3 Separate Funds

Trust Fund Money Used for Benefits

Retirement
Survivors
Disability
Hospital

Voluntary Medical Insurance

Premiums by people 65 or over who sign up-
Equal contribution by government

A Separate Trust Fund

Medical

INSURANCE
UNIT IV

ASSIGNMENT SHEET #1--EVALUATING YOUR FAMILY INSURANCE PROGRAM

With the help of your parents, complete the following information in regard to your family insurance program.

1. Review of your automobile insurance.

Auto Description	Liability Limits	Medical	Comprehensive	Collision

a. Liability limits are the same on each vehicle. Yes_____ No_____

b. Liability limits are equal to family assets. Yes_____ No_____

c. Each vehicle has medical coverage. Yes_____ No_____

d. Comprehensive and collision should be dropped on older vehicles. Yes_____ No_____

e. Comprehensive and collision should be added to one or more vehicles. Yes_____ No_____

f. All vehicles have liability coverage. Yes_____ No_____

ASSIGNMENT SHEET #1

g. Using the information and recommendations included in this unit, what changes would you recommend in the coverages of your family vehicles?

2. Review of your property insurance program

Description	Amount of Coverage
Dwelling	____________
Contents	____________
Garage	____________
Barn	____________
Other Building #1	____________
Other Building #2	____________
Other Building #3	____________
Farm Liability or personal liability	____________
Machinery	____________
Tools	____________
Livestock	____________
Grain	____________
Hay	____________
Other:	____________

a. Our property is fully insured. Yes_____ No_____

(NOTE: To be fully insured and avoid co-insurance on the dwelling, it must be insured for at least eighty percent of replacement cost.)

ASSIGNMENT SHEET #1

b. In the event house and contents were lost to fire, insurance would replace same house, all clothes, furniture, appliances, books, ets.
Yes_____ No_____

c. All barns vital to farm operation are insured. Yes_____
No_____

d. All tools, machinery, hay, and grain vital to the farm operation are insured. Yes_____ No_____

e. Liability limits are adequate to protect farm or property in the event of a suit. Yes_____ No_____

f. Liability coverage includes protection for employees.
Yes_____ No_____

g. Crop hail or federal crop insurance is used on our farm
Yes_____ No_____

h. Based on information and recommendations in this unit, what suggestions would you make in your family's property insurance coverages?

3. Review your family's life insurance program.

	Amount of Policy	Kind of Policy
Father		
Mother		
Yourself		
Brother		
Sister		

a. In event of death of your father, there would be enough cash, including life insurance proceeds, to pay all debts, funeral expenses, etc.
Yes_____ No_____

ASSIGNMENT SHEET #1

b. After paying debts and expenses, family income would be such to insure adequate education for all children.
Yes_____ No_____

c. Enough cash to pay state and federal estate taxes will be available in the event of death of mother or father.
Yes_____ No _____

(NOTE: For more information, check with your accountant, attorney, or insurance agent.)

d. Members of my family have term insurance coverage that should be converted to permanent coverage. Yes_____ No_____

4. Review of health insurance and social security.

a. All members of family are covered by health insurance.
Yes_____ No_____

b. Hospital surgical type coverage is included in our policy.
Yes_____ No_____

c. Major medical coverage is included in our policy. Yes_____
No_____

d. At least one member of family is covered by disability income or workmen's compensation. Yes_____ No_____

e. My parents and I have recently checked our accounts with social security to verify the credit of all payments.
Yes_____ No_____

(NOTE: Any mistakes the social security administration has made during the past three years can be corrected. Mistakes not corrected within three years are lost.)

f. If answer to "e" was no, obtain from your postmaster a card which may be mailed to the social security administration for verification of your payments.

INSURANCE
UNIT IV

TEST

1. Match the following definitions with the terms on the right.

(NOTE: Answers to "a" through "m" are listed on this page.)

_____a. Insurance payable to the insured if living on maturity date or death prior to maturity

_____b. An accidental death benefit to pay double face amount in case of death by accident

_____c. The provision added to life insurance to pay premiums if totally and permanently disabled

_____d. Gives protection for a stated period of time and at the end of term is the termination of contract

_____e. Includes straight life, limited pay, and endowment

_____f. Written through lending institutions on lives of borrowers

_____g. A combination of several coverages or protections in one policy regarding home, personal property, and liability insurance

_____h. A combination of permanent life insurance and decreasing term insurance

_____i. When one is negligent and therefore liable for injury or damage caused to someone else

_____j. Act of congress which provides retirement and disability income and is funded by social security tax

1. Endowment insurance
2. Disability benefit (Waiverof premium)
3. Double indemnity
4. Insurance
5. Premium
6. Family income life insurance
7. Credit insurance
8. Term life insurance
9. Permanent life insurance
10. Homeowner's policy
11. Liability
12. Co-Insurance
13. Social security

_____k. When one is carrying part of the risk and is not fully insured

_____l. Spreads the risk of one person's misfortune among a large number of persons

_____m. The payment or consideration one makes as a policyholder in agreement with the policy for insurance

(NOTE: Answers to "n" through "bb" are listed on this page.)

_____n. Cash loaned on the cash value of policy at a specified interest rate

_____o. Term insurance exchanged at option of policyholder without evidence of insurability for another insurance plan

_____p. Amount available in cash upon voluntary termination of policy before death

_____q. A contract that provides an income for a specified period of time such as a number of years or for life

_____r. A statement of information made by a person applying for insurance

_____s. A provision authorizing the premium to be subtracted from policy cash values if not paid by the end of the grace period

_____t. Person named in the policy to receive proceeds at death of insured

_____u. Amount stated on the face of the policy that will be paid in case of death or at maturity.

_____v. A period (usually 31 days) following the premium due date during which a premium may be paid without a penalty

14. Cash value
15. Automatic premium loan
16. Annuity
17. Application
18. Beneficiary
19. Convertible
20. Policy loan
21. Policy
22. Group insurance
23. Face amount
24. Loss payable clause
25. Grace period
26. Lapsed policy
27. Policy dividend
28. No fault insurance

_____w. Insurance which is usually issued without medical examination on a group of persons under a single master contract

_____x. A policy terminated for nonpayment of premium

_____y. Document stating terms of contract that is issued to policyholder by the company

_____z. A refund of part of the premium on participating policies plus interest

_____aa. Names the mortage company on the policy whereby any claim is payable to mortgage company up to the amount of mortgage

_____bb. In regard to auto insurance, everyones company will pay for their own damage and injury

2. Match the following definitions of liability insurance with the terms on the right.

_____a. Pays the employee's medical expense regardless of who is negligent

_____b. Similar to public liability but is designed specifically for farmers

_____c. Protects policyholder from lawsuits by members of the public who suffer property or bodily injury caused by his negligence

_____d. Protects employer when he is liable for on-the-job accidents caused by his negligence

1. Public liability
2. Employer's liability
3. Workmen's compensation
4. Farmer's comprehensive liability

3. Match the basic auto coverages with the terms on the right.

_____a. Insurance pays for damages to one's car regardless of the burden of negligence

1. Protection against uninsured motorist

_____b. Pays for any medical, dental, hospital, nursing, or funeral expenses incurred as the result of an auto or truck accident involving the insured vehicle regardless of fault

_____c. Protects the policyholder financially if he or a member of his family injures someone while operating his vehicle

_____d. Protects the policyholder financially if he or a member of his family damages someone's automobile or other property

_____e. Insures auto against glass breakage, theft, and all weather elements

_____f. Coverage for holder to recover loss for bodily injury caused by a person having no liability insurance

2. Bodily injury liability
3. Property damage liability
4. Medical reimbursement
5. Comprehensive physical damage
6. Collision

4. Explain in writing what is meant by a 10-20-5 automobile liability policy.

5. Select from the list below the factors that determine what automobile coverages to buy. Place an "X" by the correct factors.

_____a. Liability insurance would be purchased for every licensed vehicle

_____b. Liability limits should be less on automobiles not used very often

_____c. It is not advisable to carry medical insurance on every vehicle

_____d. Consider dropping comprehensive and collision insurance when able to afford repair on the car from personal funds

6. Select from the list below those items that influence automobile insurance premiums. Place an "X" by the correct items.

_____a. Number of basic coverages one carries

_____b. Area one lives

_____c. Name of car manufacturer

_____d. Age

_____e. Sex

_____f. Height

_____g. Driving habits of individuals

7. List two ways to save on automobile insurance.

a.

b.

8. Match the types of property insurance on the right with the proper definition.

_____a. A package policy generall town property that insures the dwelling, additional property such as household goods, and comprehensive personal liability; to qualify for this policy, the dwelling must be owner occupied

_____b. Protects dwelling, farm buildings, and personal property against the perils of fire, lightning, wind, hail, explosion, riot, and civil commotion

_____c. Same as homeowners plus optional coverages of farm barns and buildings, machinery, grain, hay, livestock, tools and equipment, and employer's liability

1. Fire and extended coverage
2. Homeowners
3. Farm owners

9. Select from the list the items that influence the cost of property insurance. Place an "X" by the correct items.

_____a. Amount of protection

_____b. Type of construction (wood or brick)

_____c. Age of people living on property

_____d. Distance from fire department

_____e. Marital status of applicant

10. Name two basic rules to use when buying property insurance.

a.

b.

11. Distinguish between crop hail and federal crop insurance by writing crop hail or federal crop as it applies to the following statements.

a. ______________Pays up to the guaranteed yield

b. ______________An insurance company policy that protects against loss by hail or fire; optional coverage is loss by wind

c. ______________The amount of loss payable is the amount of insurance multiplied by the percentage of damage

d. ______________Provides "all risk" crop investment insurance

e. ______________Damage percentage is determined by sampling methods that are agreeable to both parties

f. ______________Does not insure profit for the farmer or cover avoidable losses such as those caused by neglect or poor farming practices

12. Match the characteristics on the left with the correct kind of life insurance on the right.

(NOTE: These terms can be used more than once.)

_____a. Covers the stated number of years or term that the policy is in effect

_____b. Premiums are paid throughout the policyholder's lifetime

_____c. Premiums are paid only during a specified period of time; provides lifetime protection

_____d. No guarantee of renewal

_____e. Policy puts emphasis on savings more than any other life insurance

_____f. Expensive form of insurance for protection

_____g. Most widely used of all permanent life insurance

1. Term insurance
2. Limited payment life insurance
3. Endowment life insurance
4. Straight life insurance

13. Discuss in writing instances when a family income life insurance policy would be needed most.

14. Select from the list below the factors that determine the amount of life insurance needed. Place an "X" by the proper factors.

_____a. Size of the family

_____b. Age and sex of children

_____c. Indebtedness of the family

_____d. Location within the state

_____e. Race

15. Match the kind of health insurance on the right with the proper definition.

(NOTE: These terms can be used more than once.)

_____a. Pays for expenses associated with a catastrophe and has a large deductible clause of from $100 to $1000 but has a large benefit limit

_____b. Known as first dollar coverage with a small deductible clause

_____c. Pays a stated amount while a person is disabled because of injury or illness

_____d. Usually pays 80% for eligible expenses for the first one to five thousand dollars and 100% thereafter until maximum benefits are reached

_____e. Usually has specified limits on room and board, hospital special charges, surgery, and out patient care

16. Select from the list below the features of workmen's compensation for those who qualify. Place an "X" by the statement.

_____a. Employer must insure employees

_____b. Covers injury on the job

_____c. Pays percentage of earnings while disabled

_____d. Usually applies to firms with two full time employees

_____e. Pays death benefits regardless of cause

_____f. Protects the employee unless he is negligent

17. Select from the list below the kinds of work covered by social security. Place an "X" by correct answers.

_____a. Almost every kind of employment and self-employment

_____b. Farm employee working fifteen days for a farmer and receiving $140.00 for this work

_____c. Self-employed farmers and ranchers

18. Select from the list below the benefits that are paid from social security funds. Place an "X" by the correct statements.

_____a. Monthly survivors benefits to a widow at age 62

_____b. Monthly survivors benefits to a widow at any age if she is caring for a child under 18

_____c. Full benefits for retirement at age 62

_____d. Medicare--A two-part health insurance program for older people

19. Select from the list below the reasons social security payments stop. Place an "X" by the correct answers.

_____a. All payments end if divorce is granted unless one is age 62 or older or if the marriage lasted at least thirty continuous years

_____b. Payments to wife under 62 stop when she no longer has a child under 24 or disabled

_____c. When a person is no longer disabled, payments stop to dependents

_____d. When a dependent child reaches 18, payments stop even if he is a full time student

_____e. Payments stop whenever a dependent child is adopted unless adopted by stepparent, grandparent, aunt, uncle, brother, or sister

20. Evaluate a family insurance program and recommend needed changes.

(NOTE: If this activity has not been accomplished prior to this test, ask the instructor when this is to be completed.)

INSURANCE
UNIT IV

ANSWERS TO TEST

1. a. 1

   b. 3

   c. 2

   d. 8

   e. 9

   f. 7

   g. 10

   h. 6

   i. 11

   j. 13

   k. 12

   l. 4

   m. 5

   n. 20

   o. 19

   p. 14

   q. 16

   r. 17

   s. 15

   t. 18

   u. 23

   v. 25

   w. 22

x. 26

y. 21

z. 27

aa. 24

bb. 28

2. a. 3

b. 4

c. 1

d. 2

3. a. 6

b. 4

c. 2

d. 3

e. 5

f. 1

4. a. Ten indicates insured person is protected against damages up to $10,000 for one person

b. Twenty means insured person is protected against damages up to $20,000 for two or more persons injured in one accident

c. The five indicated insured person is protected against property damage to others up to $5,000

5. a

d

6. a

b

d

e

g

7. Any two of the following:
    a. Safe driver discount
    b. Driver education discount
    c. Two or more cars discount

8. a. 2
    b. 1
    c. 3

9. a
    b
    d

10. Any two of the following:
    a. Do not insure if financially able to do without or to replace with personal funds, or if a loss would not hamper the farm operation
    b. Insure if there is a loan against property under personal ownership
    c. Write enough coverage to replace the loss

11. a. Federal crop
    b. Crop hail
    c. Crop hail
    d. Federal crop
    e. Crop hail
    f. Federal crop

12. a. 1
    b. 4
    c. 2
    d. 1

e. 3

f. 3

g. 4

13. When there are small children to be educated or reared or while policyholder is paying off mortgage

14. a

b

c

15. a. 2

b. 1

c. 3

d. 2

e. 1

16. a

b

c

17. a

c

18. a

b

d

19. a

c

e

20. Evaluated to the satisfaction of the instructor.

TAX MANAGEMENT
UNIT V

TERMINAL OBJECTIVES

After completion of Unit V, the student should be able to list reasons good records are important and to match the advantages and disadvantages to the proper method of reporting farm income. He should be able to distinguish between taxable and non-taxable items and to complete schedule F of a 1040 form. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms and definitions associated with tax management.
2. List reasons good records are important for income tax management.
3. Match the method of reporting farm income with the proper definition.
4. Match the advantages and disadvantages to the proper method of reporting farm income.
5. Distinguish between taxable and non-taxable items when given a list.
6. Select from a list ways to avoid extrememly high or low taxable income.
7. Match the method of depreciation with the proper definition.
8. Determine annual depreciation when using the straight line method.
9. Select from a list those who must file an income tax return.
10. Complete schedule F and transfer information to a 1040 form when given an assimulated situation.

TAX MANAGEMENT
UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Provided in this unit:

1. Objectives
2. Information sheets
3. Assignment sheets
    - #1 - Calculating Straight Line Depreciation
    - #2 - Completing Schedule F and Transferring to a 1040 Form
4. Answers to assignment sheets
5. Test
6. Answers to test

References:

1. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agriculture Service, Inc., 1971

2. U.S., Treasury Department, Internal Revenue Service, Your Federal Income Tax, 1973 Edition, Publication 17.

Optional Teaching aids:

1. U.S., Treasury Department, Internal Revenue Service, Teaching Taxes Program, Teacher's Guide, 1973 Edition, Publication 19.

2. U.S., Treasury Department, Internal Revenue Service, Farm Edition, Publication 22

   (NOTE: Publication #22 and #19 may be ordered free of charge from the Internal Revenue Service.)

3. **Films**

(NOTE: Internal Revenue District Offices have several tax films which can be borrowed on request.)

TAX MANAGEMENT
UNIT V

INFORMATION SHEET

I. Terms and definitions

A. Schedule F--A tax form used along with the 1040 form to complete farm income and expenses

B. Market livestock--Animals raised on farm primarily for sale

C. Purchased livestock--Animals bought for resale

D. Other farm income--Farm income received other than sale of crops and livestock

(NOTE: This includes machine hire, Government payments, and patronage dividends.)

E. Depreciation--Decline in value of an asset due to such causes as wear and tear, action of elements, obsolescence, and inadequacy

F. Assets--Items or resources owned

G. Tax basis--The dollar amount used to compute depreciation

(NOTE: As depreciation accumulates the tax basis decreases. Tax basis does not necessarily have any relation to market value. Usually the cost of a purchased asset is the starting basis.)

H. Salvage value--Value of an asset at the end of its useful life

I. Self-employed--Person operating his own business

(NOTE: The operation can be on your own farm through your own personal labor or with hired labor, as a tenant, or as a member of a partnership.)

J. Ad valorem tax--Assessment taxes against real property, personal property, and public service property

(NOTE: The greater part of ad valorem taxes goes for the support of public schools and is used for the support of county and sometimes city governments.)

K. Income averaging--Permits the taxpayer who receives an unusually large amount of income in one year to be taxed on this income as if it had been received over a five year period

INFORMATION SHEET

II. Reasons good records are important for tax management

  A. Records identifying receipts make it possible to substantiate the fact that some of these receipts are from a source which makes them non-taxable

  B. If expenses are not recorded at the time they are incurred or paid, some may be overlooked or forgotten when preparing a tax return.

  (NOTE: An overlooked item of $25 could cost you $5 or more in extra tax dollars.)

  C. The cost of farm assets should be recorded so the depreciation allowance can be determined

  D. Upon audit of an income tax return by the Internal Revenue Service, good records are needed to verify the items reported

  E. If records show the date an asset was acquired, for what it was used, and whether it was sold, traded, destroyed, or otherwise disposed of, capital gains provisions of the law or 100 percent loss provisions can sometimes be claimed

  F. Records are valuable for efficient farm management and provide a basis for analyzing a business and for obtaining credit

  G. Records should establish the amount of earnings to be reported for self-employment social security tax purposes

  (NOTE: Cancelled checks and deposit slips are best verifications of transactions.)

III. Methods of reporting farm income

  A. Cash method--Income is reported in the year cash or its equivalent is received from the sales produce or property or for services performed; deductions for farm expense items are made in the year in which they are paid out

  B. Accrual method--Use inventories of livestock, crops, produce, feed, supplies, etc. to determine gross income; sales are treated as income when the price of the item is recoverable; expenses are deductible when payable

  C. Crop method--If producing a crop that takes more than a year from planting to harvesting and selling, one may use the crop method of accounting: the expenses of producing the crop are deducted in the year of sale; profit or loss is not determined until the crop is harvested and sold

  (NOTE: Sugar cane is an example of a crop suited for the crop accounting method because the growing period is more than one year.)

INFORMATION SHEET

IV. Advantages and disadvantages of each method of reporting farm income

- A. Cash method
  - 1. Advantages
    - a. Most simple method
    - b. Most flexible as one can choose when to incur income and deduct expenses
    - c. One works with actual money rather than abstract figures
  - 2. Disadvantages
    - a. Income may be erratic--An unusually good year could balloon income into a high tax bracket
    - b. In a low income year, allowable deductions and exemptions may be low by having too little income
- B. Accrual method
  - 1. Advantages
    - a. Levels out income without the necessity of year-end manipulation
    - b. The over-all effect is to defer cost of producing crops, livestock, or other products to be offset against the sale price
    - c. One has a close check on all operations due to the requirement of more accurate record keeping
  - 2. Disadvantages
    - a. Records are required to be detailed and complex
    - b. One works with abstract figures rather than actual money
    - c. The actual cash position is difficult to determine
- C. Crop method
  - 1. Advantages
    - a. Expenses of producing the crop are deducted in the year of sale
    - b. When the crop is sold, that account is closed and gain or loss is shown in a particular tax year

INFORMATION SHEET

2. Disadvantages

   a. Each crop is considered a distinct venture with a separate account

   b. With the crops grown in Kansas this method would not apply to most crops

V, Taxable and non-taxable items

A. Taxable items

1. Compensation for services
2. Dividends received from business dealings
3. Income from royalities
4. Estates and trusts income
5. Commissions
6. Income from interest
7. Rent income
8. Income from partnerships
9. Profits from sales or exchanges of property
10. Gross income from the farm or ranch business
11. Government program payments
12. Gasoline tax refunds
13. Insurance proceeds received for crop damage or farm building damage
14. Easement payments and other unearned income

B. Non-taxable items

1. Exchanges of business property presently may not be taxed
2. Commodity credit loans would not be income until the commodity is sold or turned to the governement
3. Social security benefits, railroad retirement pensions, and war veteran's disability pensions

INFORMATION SHEET

4. Fair market value of produce or livestock raised and consumed by farmer and his family
5. Life insurance paid by reason of death
6. Gifts, bequests, and inheritances
7. Loans
8. Income tax refunds

   (NOTE: Interest paid in the refund is taxable.)
9. The value of work performed by farmer, his wife, or children on the farm
10. Increase in the value of crops, livestock, or other assets unless sold or exchanged when on the cash method of accounting

    (NOTE: Accrual taxpayers must reflect the increase in value.)
11. Sickness and injury benefits, if received as damages in settlement of a claim or under a health and accident insurance policy
12. Educational grants and scholarships

VI. Ways to avoid extremely high or low taxable incomes

A. Periods when income is high

1. Pay debts
2. Hire children

   (NOTE: A child using the new low-income allowance plus his exemption of $750 may earn $2050.00 free of tax; this applies to 1973.)
3. Purchase needed machinery and livestock
4. Hold crops and livestock off market
5. Use maximum initial depreciation
6. Make needed repairs
7. Use income averaging
8. Do extra conservation work

INFORMATION SHEET

B. Periods when income is low

1. Use slower depreciation

   (NOTE: Method of depreciation on same item must remain consistent from one year to another.)

2. Postpone debt payments

3. Sell crops and livestock

4. Collect accounts receivable

5. Do additional custom work

VII. Methods of depreciation

A. Straight line--Yearly depreciation consists of dividing total anticipated depreciation by the number of years asset is expected to last

B. Diminishing balance--A fixed rate of depreciation is used every year and applies to the value of the asset at the beginning of the year

(NOTE: The rate of depreciation should be near twice that used for straight line method.)

C. Sum-of-the-digits method--Annual depreciation is determined by multiplying a fraction times the amount to be depreciated

(NOTE: The amount to be depreciated is cost minus salvage value.)

D. Additional first year depreciation--An additional 20 percent first year depreciation on new or used tangible personal property may be used if proper provisions are met

Example:	Cost of new tractor	$3,200.00
	One shot depreciation (20% x 3,200)	640.00
	Adjusted basis	$2,560.00
	Less: Estimated salvage value	200.00
	Adjusted basis for depreciation	$2,360.00
	Divided by expected life	236.00
	Add: 20% depreciation above	640.00
	Total current allowable depreciation	876.00

INFORMATION SHEET

(NOTE: After taking the 20 percent depreciation, regular depreciation may be taken on the remaining cost basis from the date of purchase to the end of the year. The following provisions must be met in order to claim additional first year depreciation:

1. The property must have a useful life of six years or more
2. The total cost of such properties is not more than $10,000 ($20,000 on a joint return)
3. Property is not acquired from spouse, parent, child or other ancestor or lineal descendant
4. Property is not acquired in transactions between certain related partnerships, corporations, stockholders, beneficiaries, or grantors of trusts
5. If property is acquired through a trade, only the difference paid is subject to this additional depreciation)

VIII. Calculating straight line depreciation

A. Original cost--$300.00

B. Expected life--10 years

C. Salvage value--$20.00

D. Annual depreciation--$300.00 minus $20.00 = $280.00 divided by 10 years equals $28.00 per year

IX. Who must file a return

A. A single individual under 65 years of age having $2,050 or more gross income for the year

B. A single individual over age 65 having $2,800 or more gross income for the year

C. Any individual who may be claimed as the dependent of another taxpayer must file a return if gross income is $750 or more

(NOTE: An unmarried full time student may earn $2050.00 per year and still be claimed as a dependent.)

D. Married persons under 65 years of age having the combined gross income of $2,800 per year provided a joint return is used

INFORMATION SHEET

E. Married persons, one being above 65 years of age, having a combined gross income of $3,550 per year provided a joint return is filed

F. Married persons, both 65 years or older having a combined gross income of $4,300 per year provided a joint return is filed

G. Self-employed persons having net earnings from self-employment of $400 or more per year

(NOTE: This applies to any self-employed person regardless of age.)

H. If income tax was withheld during the year but not enough income earned to file a return one can get a refund by filing and still be claimed as a dependent by another taxpayer

I. A surviving wife or husband of a decedent who would have been required to file had he lived, and no executor, administrator, or legal representative has been appointed.

TAX MANAGEMENT
UNIT V

ASSIGNMENT SHEET #1--CALCULATING STRAIGHT LINE DEPRECIATION

Using the information below, calculate the depreciation using the straight line method.

1. Tractor
   a. Original cost $10,000.00
   b. 3 years old
   c. Expected life 10 years
   d. Salvage value--$700.00
   e. Yearly depreciation__________________
2. Portable grinder-mixer
   a. Original cost--$2,000.00
   b. 1 year old
   c. Expected life--7 years
   d. Salvage value--$500.00
   e. Yearly depreciation__________________
3. 16 foot stock trailer
   a. Original cost--$800.00
   b. 4 years old
   c. Expected life--5 years
   d. Salvage value—$200.00
   e. Yearly depreciation__________________

TAX MANAGEMENT
UNIT V

ASSIGNMENT SHEET #2--COMPLETING SCHEDULE F AND TRANSFERRING TO A 1040 FORM

Use the following information to complete schedule F parts I, II, and III and transfer this information to a 1040 form.

1. John Cook is a student who lives with his parents in Jennings, Kansas.
2. John's social security number is 229-46-2479.
3. John worked at the local elevator and earned $2,000.00 of which $117.00 was withheld for social security and $155.00 was withheld for federal income taxes.
4. According to John's record book he has the following items set up on a straight line depreciation schedule.
    a. Hog house
        1) 1 year old
        2) Original cost--$40.00
        3) Useful life--10 years
        4) Salvage value--$0
    b. Fence
        1) 1 year old
        2) Original cost--$55.00
        3) Useful life--5 years
        4) Salvage value--$0
    c. Hog house
        1) New
        2) Cost--$42.00
        3) Useful life--10 years
        4) Salvage value--$0

ASSIGNMENT SHEET #2

D. Farm equipment

1) 1 year old

2) Original cost--$105.00

3) Useful life--5 years

4) Salvage value--$15.00

5. John has two sows which he farrows twice per year and feeds all his pigs out to market weight.

6. John's record book shows the following sales and expenses for the year.

EXPENSES

Date	Item of Expense and Description	Total Expense	Charge to Enterprise					
			1	2	3	4	5	6

SALES AND OTHER INCOME

Date	Item of Sale and Description	Total Expense	Charge to Enterprise					
			1	2	3	4	5	6

ASSIGNMENT SHEET #2

Ag. IV - 153-A

Form 1040 US Department of the Treasury—Internal Revenue Service Individual Income Tax Return 1975

For the year January 1–December 31, 1975, or other taxable year beginning ...., 1975, ending ...., 19

Please print or type

Name (If joint return, give first names and initials of both) | Last name

Present home address (Number and street, including apartment number, or rural route)

City, town or post office, State and ZIP code

Your social security number

Spouse's social security no.

For Privacy Act Notification, see page 2 of Instructions.

For IRS use only

Occupation: Yours ▶ .... Spouse's ▶ ....

Requested by Census Bureau for Revenue Sharing ▶

A In what city, town, village, etc., do you live?

B Do you live within the legal limits of the city, town, etc.? ☐ Yes ☐ No ☐ Don't know

C In what county and State do you live? County .... State ....

D In what townsh... you live? (See page 4

Filing Status

1 ☐ Single (check only ONE box)

2 ☐ Married filing joint return (even if only one had income)

3 ☐ Married filing separately. If spouse is also filing give spouse's social security number in designated space above and enter full name here ▶ ....

4 ☐ Unmarried Head of Household (See page 5 of Instructions) ▶ ....

5 ☐ Qualifying widow(er) with dependent child (Year spouse died ▶ 19). See page 5 of Instructions.

Exemptions

6a Regular ☐ Yourself ☐ Spouse — Enter number of boxes checked ▶

b First names of your dependent children who lived with you .... Enter number ▶

c Number of other dependents (from line 27) ▶

d Total (add lines 6a, b, and c) ▶

e Age 65 or over ☐ Yourself ☐ Spouse — Blind ☐ Yourself ☐ Spouse — Enter number of boxes checked ▶

7 Total (add lines 6d and e) ▶

8 Presidential Election Campaign Fund ▶ Do you wish to designate $1 of your taxes for this fund? Yes No — If joint return, does your spouse wish to designate $1? Yes No

Note: If you check the "Yes" box(es) it will not increase your tax or reduce your refund.

Income

9 Wages, salaries, tips, and other employee compensation (Attach Forms W-2. If unavailable, see page 3 of instructions.) — 9

10a Dividends (See pages 7 and 14 of Instructions) $............, 10b Less exclusion $............, Balance ▶ — 10c

(If gross dividends and other distributions are over $400, list in Part I of Schedule B.)

11 Interest income. [If $400 or less, enter total without listing in Schedule B / If over $400, enter total and list in Part II of Schedule B] — 11

12 Income other than wages, dividends, and interest (from line 36) — 12

13 Total (add lines 9, 10c, 11, and 12) — 13

14 Adjustments to income (such as "sick pay," moving expenses, etc. from line 42) — 14

15 Subtract line 14 from line 13 (Adjusted Gross Income) (If less than $8,000, see page 8 of Instructions on "Earned Income Credit.") — 15

- If you do not itemize deductions and line 15 is under $15,000, find tax in Tables and enter on line 16a.
- If you itemize deductions or line 15 is $15,000 or more, go to line 43 to figure tax.
- CAUTION. If you have unearned income and can be claimed as a dependent on your parent's return, check here ▶ ☐ and see page 7 of Instructions.

Tax, Payments and Credits

16a Tax, check if from: ☐ Tax Tables ☐ Schedule D ☐ Tax Rate Schedule X, Y, or Z ☐ Schedule G OR ☐ Form 4726 — 16a

b Credit for personal exemptions (multiply line 6d by $30) — b

c Balance (subtract line 16b from line 16a) — c

17 Credits (from line 54) — 17

18 Balance (subtract line 17 from line 16c) — 18

19 Other taxes (from line 63) — 19

20 Total (add lines 18 and 19) — 20

21a Total Federal income tax withheld (attach Forms W-2 or W-2P to front) — 21a

b 1975 estimated tax payments (include amount allowed as credit from 1974 return) — b

c Earned income credit — c

d Amount paid with Form 4868 — d

e Other payments (from line 67) — e

22 Total (add lines 21a through e) — 22

Pay amount on line 23 in full with this return. Write social security number on check or money order and make payable to Internal Revenue Service.

Balance Due or Refund

23 If line 20 is larger than line 22, enter BALANCE DUE IRS ▶ — 23

(Check here ▶ ☐, if Form 2210, Form 2210F, or statement is attached. See page 8 of instructions.)

24 If line 22 is larger than line 20, enter amount OVERPAID ▶ — 24

25 Amount of line 24 to be REFUNDED TO YOU ▶ — 25

26 Amount of line 24 to be credited on 1976 estimated tax. ▶ 26

If all of overpayment (line 24) is to be refunded (line 25), make no entry on line 26.

Please attach Copy B of Forms W-2 here

Please attach Check or Money Order here

Sign here

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief it is true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

▶ .... Your signature .... Date

▶ .... Spouse's signature (if filing jointly, BOTH must sign even if only one had income)

▶ .... Preparer's signature (other than taxpayer) .... Date

.... Address (and ZIP Code)

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ASSIGNMENT SHEET #2

Form 1040 (1975)

Other Dependents

(a) NAME	(b) Relationship	(c) Months lived in your home. If born or died during year, write B or D.	(d) Did dependent have income of $750 or more?	(e) Amount YOU furnished for dependent's support. If 100% write ALL.	(f) Amount furnished by OTHERS including dependent.
				$	$

27 Total number of dependents listed in column (a). Enter here and on line 6c . . . . ▶

Part I Income other than Wages, Dividends, and Interest

28 Business income or (loss) (attach Schedule C)	28	
29a Net gain or (loss) from sale or exchange of capital assets (attach Schedule D)	29a	
29b 50% of capital gain distributions (not reported on Schedule D—see page 9 of Instructions) . .	29b	
30 Net gain or (loss) from Supplemental Schedule of Gains and Losses (attach Form 4797) . .	30	
31a Pensions, annuities, rents, royalties, partnerships, estates or trusts, etc. (attach Schedule E) . .	31a	
31b Fully taxable pensions and annuities (not reported on Schedule E—see page 9 of Instructions) .	31b	
32 Farm income or (loss) (attach Schedule F)	32	
33 State income tax refunds (does not apply if refund is for year in which you took the standard deduction—others see page 9 of Instructions)	33	
34 Alimony received	34	
35 Other (state nature and source—See page 9 of Instructions) ▶	35	
36 Total (add lines 28 through 35). Enter here and on line 12 . . . . ▶	36	

Part II Adjustments to Income

37 "Sick pay." (attach Form 2440 or other required statement)	37	
38 Moving expense (attach Form 3903)	38	
39 Employee business expense (attach Form 2106 or statement)	39	
40a Payments to a Keogh (H.R. 10) retirement plan	40a	
40b Payments to an individual retirement arrangement from attached Form 5329, Part III	40b	
41 Forfeited interest penalty for premature withdrawal—see page 10 of Instructions	41	
42 Total (add lines 37 through 41). Enter here and on line 14 . . . . ▶	42	

Part III Tax Computation (Do not use this part if you use the Tax Tables to find your tax.)

43 Adjusted gross income (from line 15)	43	
44 (a) If you itemize deductions, check here ▶ ☐ and enter total from Schedule A, line 41 and attach Schedule A . . . . (b) If you do not itemize deductions and line 15 is $15,000 or more, check here ▶ ☐ and: If box on line 2 or 5 is checked, enter 16% of line 15 but not more than $2,600; if box on line 1 or 4 is checked, enter $2,300; if box on line 3 is checked, enter $1,300 . .	44	
45 Subtract line 44 from line 43	45	
46 Multiply total number of exemptions claimed on line 7, by $750	46	
47 Taxable income. Subtract line 46 from line 45	47	

(Figure your tax on the amount on line 47 by using Tax Rate Schedule X, Y, or Z, or if applicable, the alternative tax from Schedule D, income averaging from Schedule G, or maximum tax from Form 4726.) Enter tax on line 16a.

Part IV Credits

48 Retirement income credit (attach Schedule R)	48	
49 Investment credit (attach Form 3468)	49	
50 Foreign tax credit (attach Form 1116)	50	
51 Contributions to candidates for public office credit—see page 10 of Instructions	51	
52 Work Incentive (WIN) credit (attach Form 4874)	52	
53 Purchase of new principal residence credit (attach Form 5405)	53	
54 Total (add lines 48 through 53). Enter here and on line 17 . . . . ▶	54	

Part V Other Taxes

55 Tax from recomputing prior-year investment credit (attach Form 4255)	55	
56 Tax from recomputing prior-year Work Incentive (WIN) credit (attach Schedule)	56	
57 Minimum tax. Check here ▶ ☐, if Form 4625 is attached	57	
58 Tax on premature distributions from attached Form 5329, Part V	58	
59 Self-employment tax (attach Schedule SE)	59	
60 Social security tax on tip income not reported to employer (attach Form 4137)	60	
61 Uncollected employee social security tax on tips (from Forms W-2)	61	
62 Excess contribution tax from attached Form 5329, Part IV	62	
63 Total (add lines 55 through 62). Enter here and on line 19 . . . . ▶	63	

Part VI Other Payments

64 Excess FICA, RRTA, or FICA/RRTA tax withheld (two or more employers—see page 10 of Instructions)	64	
65 Credit for Federal tax on special fuels, nonhighway gasoline and lubricating oil (attach Form 4136)	65	
66 Credit from a Regulated Investment Company (attach Form 2439)	66	
67 Total (add lines 64 through 66). Enter here and on line 21e . . . . ▶	67	

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ASSIGNMENT SHEET #2

Ag. IV - 155-A

SCHEDULE F
(Form 1040)
Department of the Treasury
Internal Revenue Service

Farm Income and Expenses

(Compute social security self-employment tax on Schedule SE)
► Attach to Form 1040. ► See Instructions for Schedule F (Form 1040).
► If rental income, see instructions before using this schedule.

1975

Name(s) as shown on Form 1040

Social security number

Business name and address

Location of farm(s) and number of acres in each farm

Employer identification number (See instructions)

Part I Farm Income—Cash Receipts and Disbursements Method

Do not include sales of livestock held for draft, breeding, sport, or dairy purposes; report such sales on Form 4797.

Sales of Purchased Livestock and Other Items Purchased for Resale

a. Description	b. Amount received	c. Cost or other basis
1 Livestock:	$	$
2 Other items:		
3 Totals	$	$
4 Profit or (loss), subtract line 3, column c from line 3, column b ►		$

Sales of Market Livestock and Produce Raised and Held Primarily for Sale and Other Farm Income

Kind	Quantity	Amount
5 Cattle		$
6 Calves		
7 Sheep		
8 Swine		
9 Poultry		
10 Dairy products		
11 Eggs		
12 Wool		
13 Cotton		
14 Tobacco		
15 Vegetables		
16 Grain		
17 Fruits and nuts		
18 Other (specify):		

OTHER FARM INCOME	
19 Machine work	
20 (a) Patronage dividends (See Sch. F instructions)	
(b) Per-unit retains (See Sch. F instructions)	
21 Nonpatronage distributions from exempt cooperatives	
22 Agricultural program payments:	
(a) Cash	
(b) Materials and services	
23 Commodity credit loans under election (or forfeited)	
24 Federal gasoline tax credit	
25 State gasoline tax refund	
26 Other (specify):	
27 Add lines 5 through 26	$
28 Gross profit *(add lines 4 and 27) ►	$

Part II Farm Deductions—For Cash and Accrual Method Taxpayers

F

Do not include personal or living expenses not attributable to production of farm income, such as taxes, insurance, repairs, etc., on your dwelling.

Items	Amount
29 Labor hired	$
30 Repairs, maintenance	
31 Interest	
32 Rent of farm, pasture	
33 Feed purchased	
34 Seed, plants purchased	
35 Fertilizers, lime, chemicals	
36 Machine hire	
37 Supplies purchased	
38 Breeding fees	
39 Veterinary fees, medicine	
40 Gasoline, fuel, oil	
41 Storage, warehousing	
42 Taxes	
43 Insurance	
44 Utilities	
45 Freight, trucking	
46 Conservation expenses	
47 Land clearing expenses	
48 Pension and profit-sharing plans (see Sch. F instructions)	
49 Employee benefit programs other than line 48 (see Sch. F instructions)	
50 Other (specify):	
51 Add lines 29 through 50 ►	$
52 Depreciation (from line 59, Part III) ►	
53 Total deductions. Add lines 51 and 52 ►	$

54 Net farm profit or (loss) (subtract line 53 from 28). Enter here and on Form 1040, line 32. **ALSO** enter on Schedule SE, Part I, line 1(a) ►	$

* Use amount on line 28 for optional method of computing net earnings from self-employment. (See Schedule SE, Part I, line 3.)

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ASSIGNMENT SHEET #2

Part III Depreciation (Do not include property you and your family occupy as a dwelling, its furnishings, and other items used for personal purposes.) If you need more space, you may use Form 4562

Note: If depreciation is computed by using the Class Life (ADR) System for assets placed in service after December 31, 1970, or the Guideline Class Life System for assets placed in service before January 1, 1971, you must file Form 4832 (Class Life (ADR) system) or Form 5006 (Guideline Class Life System). Except as otherwise expressly provided in income tax regulations sections 1.167(a)-11(b)(5)(vi) and 1.167(a)-12, the provisions of Revenue Procedures 62-21 and 65-13 are not applicable for taxable years ending after December 31, 1970. (See Publication 534.)

If you elected the Class Life (ADR) System this taxable year, check this box . . . ☐

If you elected the Guideline Class Life System this taxable year, check this box . . . ☐

a. Group and guideline class or description of property	b. Date acquired	c. Cost or other basis	d. Depreciation allowed or allowable in prior years	e. Method of computing depreciation	f. Life or rate	g. Depreciation for this year
55 Total additional first-year depreciation (do not include in items below) →						
56 Depreciation from Form 4832 (See Note above)			▨	▨	▨	
57 Depreciation from Form 5006			▨	▨	▨	
58 Other depreciation:						
Buildings						
Furniture and fixtures						
Transportation equipment						
Machinery and other equipment						
Other (specify):						
59 Totals			Enter here and in Part II, line 52 ►			

Part IV Farm Income—Accrual Method (Do not include sales of livestock held for draft, breeding, sport, or dairy purposes; report such sales on Form 4797 and omit them from "On hand at beginning of year" column)

Description (Kind of livestock, crops, or other products)	On hand at beginning of year		Purchased during year		Raised during year	Consumed or lost during year	Sold during year		On hand at end of year	
	Quantity	Inventory value	Quantity	Amount paid	Quantity	Quantity	Quantity	Amount received	Quantity	Inventory value
		$		$				$		$
60 Totals (enter here and in Part V below)		$ (Enter on line 70)		$ (Enter on line 71)				$ (Enter on line 62)		$ (Enter on line 61)

Part V Summary of Income and Deductions—Accrual Method

61 Inventory of livestock, crops, and products at end of year		$
62 Sales of livestock, crops, and products during year	$	▨
63 Agricultural program payments: (a) Cash		▨
(b) Materials and services		▨
64 Commodity credit loans under election (or forfeited)		▨
65 Federal gasoline tax credit		▨
66 State gasoline tax refund		▨
67 Other farm income (specify):		▨
68 Add lines 62 through 67		
69 Total (add lines 61 and 68)		$
70 Inventory of livestock, crops, and products at beginning of year	$	
71 Cost of livestock and products purchased during year		
72 Gross profits *(subtract the sum of lines 70 and 71 from line 69)		$
73 Total deductions from Part II, line 53		$
74 Net farm profit or (loss) (subtract line 73 from line 72). Enter here and on Form 1040, line 32. ALSO enter on Schedule SE, Part I, line 1(a)		$

* Use amount on line 72 for optional method of computing net earnings from self-employment. (See Schedule SE, Part I, line 3.)

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TAX MANAGEMENT
UNIT V

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. $930.00
2. $214.28
3. $120.00

Assignment Sheet #2

(NOTE: Answers are on the following pages.)

ANSWERS TO ASSIGNMENT SHEETS

Form **1040** US Department of the Treasury—Internal Revenue Service
Individual Income Tax Return **1975**

For the year January 1–December 31, 1975, or other taxable year beginning , 1975 ending , 19

Please print or type

Name (If joint return, give first names and initials of both): JOHN
Last name: COOK
Present home address (Number and street, including apartment number, or rural route): BOX 111
City, town or post office, State and ZIP code: JENNINGS, KANSAS 67643

Your social security number: 229 46 2474
Spouse's social security no.
For Privacy Act Notification, see page 2 of Instructions.
For IRS use only

Occupation Yours ► STUDENT
Spouse's ►

Requested by Census Bureau for Revenue Sharing
A In what city, town, village, etc., do you live?
B Do you live within the legal limits of the city, town, etc.? ☐ Yes ☐ No ☐ Don't know
C In what county and State do you live? County State
D In what township do you live? (See page 4

Filing Status
1 ☑ Single (check only ONE box)
2 ☐ Married filing joint return (even if only one had income)
3 ☐ Married filing separately. If spouse is also filing give spouse's social security number in designated space above and enter full name here ►
4 ☐ Unmarried Head of Household (See page 5 of Instructions) ►
5 ☐ Qualifying widow(er) with dependent child (Year spouse died ► 19). See page 5 of Instructions.

Exemptions
6a Regular ☐ Yourself ☑ Spouse Enter number of boxes checked ► 1
b First names of your dependent children who lived with you Enter number ►
c Number of other dependents (from line 27) ►
d Total (add lines 6a, b, and c) ►
e Age 65 or over ☐ Yourself ☐ Spouse
Blind ☐ Yourself ☐ Spouse Enter number of boxes checked ►
7 Total (add lines 6d and e) ► 1

8 Presidential Election Campaign Fund ► Do you wish to designate $1 of your taxes for this fund? Yes No
If joint return, does your spouse wish to designate $1? Yes No
Note: If you check the "Yes" box(es) it will not increase your tax or reduce your refund.

Please attach Copy B of Forms W-2 here

Income

9	Wages, salaries, tips, and other employee compensation (Attach Forms W-2. If unavailable, see page 3 of Instructions.)	9	2000	00
10a	Dividends (See pages 7 and 14 of Instructions) $ ...., 10b Less exclusion $ .... Balance ► (If gross dividends and other distributions are over $400, list in Part I of Schedule B.)	10c		
11	Interest income. [If $400 or less, enter total without listing in Schedule B / If over $400, enter total and list in Part II of Schedule B]	11		
12	Income other than wages, dividends, and interest (from line 36)	12	790	50
13	Total (add lines 9, 10c, 11, and 12)	13	2790	50
14	Adjustments to income (such as "sick pay," moving expenses, etc. from line 42)	14	0	
15	Subtract line 14 from line 13 (Adjusted Gross Income) (If less than $8,000, see page 8 of Instructions on "Earned Income Credit")	15	2790	50

- If you do not itemize deductions and line 15 is under $15,000, find tax in Tables and enter on line 16a.
- If you itemize deductions or line 15 is $15,000 or more, go to line 43 to figure tax.
- CAUTION. If you have unearned income and can be claimed as a dependent on your parent's return, check here ► ☐ and see page 7 of Instructions.

Tax, Payments and Credits

Please attach Check or Money Order here

16a	Tax, check if from: ☑ Tax Tables ☐ Schedule D ☐ Tax Rate Schedule X, Y, or Z ☐ Schedule G OR ☐ Form 4726	16a	106	00
b	Credit for personal exemptions (multiply line 6d by $30)	b		
c	Balance (subtract line 16b from line 16a)	c		
17	Credits (from line 54)	17	0	
18	Balance (subtract line 17 from line 16c)	18	106	00
19	Other taxes (from line 63)	19	0	
20	Total (add lines 18 and 19)	20	106	00

21a	Total Federal income tax withheld (attach Forms W-2 or W-2P to front)	21a	155	00
b	1975 estimated tax payments (include amount allowed as credit from 1974 return)	b		
c	Earned income credit	c		
d	Amount paid with Form 4868	d		
e	Other payments (from line 67)	e		

Pay amount on line 23 in full with this return. Write social security number on check or money order and make payable to Internal Revenue Service.

22	Total (add lines 21a through e)	22	155	00

Balance Due or Refund

23	If line 20 is larger than line 22, enter BALANCE DUE IRS ► (Check here ► ☐, if Form 2210, Form 2210F, or statement is attached. See page 8 of Instructions.)	23		
24	If line 22 is larger than line 20, enter amount OVERPAID ►	24	49	00
25	Amount of line 24 to be REFUNDED TO YOU ►	25	49	00
26	Amount of line 24 to be credited on 1976 estimated tax. ►	26		

If all of overpayment (line 24) is to be refunded (line 25), make no entry on line 26.

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief it is true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Sign here

► Your signature Date

► Spouse's signature (if filing jointly, BOTH must sign even if only one had income)

► Preparer's signature (other than taxpayer) Date

Address (and ZIP Code)

Form 1040 (1975) Page 2

Other Dependents

(a) NAME	(b) Relationship	(c) Months lived in your home. If born or died during year, write B or D.	(d) Did dependent have income of $750 or more?	(e) Amount YOU furnished for dependent's support. If 100% write ALL.	(f) Amount furnished by OTHERS including dependent.
				$	$

27 Total number of dependents listed in column (a). Enter here and on line 6c ▶

Part I Income other than Wages, Dividends, and Interest

28	Business income or (loss) (attach Schedule C)	28		
29a	Net gain or (loss) from sale or exchange of capital assets (attach Schedule D)	29a		
29b	50% of capital gain distributions (not reported on Schedule D—see page 9 of Instructions)	29b		
30	Net gain or (loss) from Supplemental Schedule of Gains and Losses (attach Form 4797)	30		
31a	Pensions, annuities, rents, royalties, partnerships, estates or trusts, etc. (attach Schedule E)	31a		
31b	Fully taxable pensions and annuities (not reported on Schedule E—see page 9 of Instructions)	31b		
32	Farm income or (loss) (attach Schedule F)	32	790	50
33	State income tax refunds (does not apply if refund is for year in which you took the standard deduction—others see page 9 of Instructions)	33		
34	Alimony received	34		
35	Other (state nature and source—See page 9 of Instructions) ▶	35		
36	Total (add lines 28 through 35). Enter here and on line 12 ▶	36	790	50

Part II Adjustments to Income

37	"Sick pay." (attach Form 2440 or other required statement)	37		
38	Moving expense (attach Form 3903)	38		
39	Employee business expense (attach Form 2106 or statement)	39		
40a	Payments to a Keogh (H.R. 10) retirement plan	40a		
40b	Payments to an individual retirement arrangement from attached Form 5329, Part III	40b		
41	Forfeited interest penalty for premature withdrawal—see page 10 of Instructions	41		
42	Total (add lines 37 through 41). Enter here and on line 14 ▶	42		

Part III Tax Computation (Do not use this part if you use the Tax Tables to find your tax.)

43	Adjusted gross income (from line 15)	43		
44	(a) If you itemize deductions, check here ▶ ☐ and enter total from Schedule A, line 41 and attach Schedule A (b) If you do not itemize deductions and line 15 is $15,000 or more, check here ▶ ☐ and: If box on line 2 or 5 is checked, enter 16% of line 15 but not more than $2,600; if box on line 1 or 4 is checked, enter $2,300; if box on line 3 is checked, enter $1,300	44		
45	Subtract line 44 from line 43	45		
46	Multiply total number of exemptions claimed on line 7, by $750	46		
47	Taxable income. Subtract line 46 from line 45	47		

(Figure your tax on the amount on line 47 by using Tax Rate Schedule X, Y, or Z, or if applicable, the alternative tax from Schedule D, income averaging from Schedule G, or maximum tax from Form 4726.) Enter tax on line 16a.

Part IV Credits

48	Retirement income credit (attach Schedule R)	48		
49	Investment credit (attach Form 3468)	49		
50	Foreign tax credit (attach Form 1116)	50		
51	Contributions to candidates for public office credit—see page 10 of Instructions	51		
52	Work Incentive (WIN) credit (attach Form 4874)	52		
53	Purchase of new principal residence credit (attach Form 5405)	53		
54	Total (add lines 48 through 53). Enter here and on line 17 ▶	54	0	

Part V Other Taxes

55	Tax from recomputing prior-year investment credit (attach Form 4255)	55		
56	Tax from recomputing prior-year Work Incentive (WIN) credit (attach Schedule)	56		
57	Minimum tax. Check here ▶ ☐, if Form 4625 is attached	57		
58	Tax on premature distributions from attached Form 5329, Part V	58		
59	Self-employment tax (attach Schedule SE)	59		
60	Social security tax on tip income not reported to employer (attach Form 4137)	60		
61	Uncollected employee social security tax on tips (from Forms W-2)	61		
62	Excess contribution tax from attached Form 5329, Part IV	62		
63	Total (add lines 55 through 62). Enter here and on line 19 ▶	63	0	

Part VI Other Payments

64	Excess FICA, RRTA, or FICA/RRTA tax withheld (two or more employers—see page 10 of Instructions)	64		
65	Credit for Federal tax on special fuels, nonhighway gasoline and lubricating oil (attach Form 4136)	65		
66	Credit from a Regulated Investment Company (attach Form 2439)	66		
67	Total (add lines 64 through 66). Enter here and on line 21e ▶	67	0	

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ANSWERS TO ASSIGNMENT SHEETS

SCHEDULE F (Form 1040)

Department of the Treasury
Internal Revenue Service

Farm Income and Expenses

(Compute social security self-employment tax on Schedule SE)
▶ Attach to Form 1040. ▶ See Instructions for Schedule F (Form 1040).
▶ If rental income, see instructions before using this schedule.

1975

Name(s) as shown on Form 1040: JOHN COOK

Social security number: 229 46 2479

Business name and address

Employer identification number (See instructions)

Location of farm(s) and number of acres in each farm

Part I Farm Income—Cash Receipts and Disbursements Method

Do not include sales of livestock held for draft, breeding, sport, or dairy purposes; report such sales on Form 4797.

Sales of Purchased Livestock and Other Items Purchased for Resale

a. Description	b. Amount received	c. Cost or other basis
1 Livestock:	$	$
2 Other items:		
3 Totals	$	$
4 Profit or (loss), subtract line 3, column c from line 3, column b ▶		$

Sales of Market Livestock and Produce Raised and Held Primarily for Sale and Other Farm Income

Kind	Quantity	Amount
5 Cattle		$
6 Calves		
7 Sheep		
8 Swine	32	1824 60
9 Poultry		
10 Dairy products		
11 Eggs		
12 Wool		
13 Cotton		
14 Tobacco		
15 Vegetables		
16 Grain		
17 Fruits and nuts		
18 Other (specify):		

OTHER FARM INCOME

19 Machine work	
20 (a) Patronage dividends (See Sch. F instructions)	
(b) Per-unit retains (See Sch. F instructions)	
21 Nonpatronage distributions from exempt cooperatives	
22 Agricultural program payments:	
(a) Cash	
(b) Materials and services	
23 Commodity credit loans under election (or forfeited)	
24 Federal gasoline tax credit	
25 State gasoline tax refund	
26 Other (specify):	
27 Add lines 5 through 26	$ 1824 60
28 Gross profit * (add lines 4 and 27) ▶	$ 1824 60

Part II Farm Deductions—For Cash and Accrual Method Taxpayers

F

Do not include personal or living expenses not attributable to production of farm income, such as taxes, insurance, repairs, etc., on your dwelling.

Items	Amount
29 Labor hired	$
30 Repairs, maintenance	
31 Interest	
32 Rent of farm, pasture	
33 Feed purchased	917 50
34 Seed, plants purchased	
35 Fertilizers, lime, chemicals	
36 Machine hire	
37 Supplies purchased	
38 Breeding fees	60 00
39 Veterinary fees, medicine	19 00
40 Gasoline, fuel, oil	
41 Storage, warehousing	11 50
42 Taxes	
43 Insurance	
44 Utilities	
45 Freight, trucking	
46 Conservation expenses	
47 Land clearing expenses	
48 Pension and profit-sharing plans (see Sch. F instructions)	
49 Employee benefit programs other than line 48 (see Sch. F instructions)	
50 Other (specify):	
51 Add lines 29 through 50 ▶	$ 1008 00
52 Depreciation (from line 59, Part III) ▶	26 10
53 Total deductions. Add lines 51 and 52 ▶	$ 1034 10

54 Net farm profit or (loss) (subtract line 53 from 28). Enter here and on Form 1040, line 32. ALSO enter on Schedule SE, Part I, line 1(a) ▶ $ 790 50

* Use amount on line 28 for optional method of computing net earnings from self-employment (See Schedule SE, Part I, line 3.)

ANSWERS TO ASSIGNMENT SHEETS

Schedule F (Form 1040) 1975

Part III **Depreciation** (Do not include property you and your family occupy as a dwelling, its furnishings, and other items used for personal purposes.) If you need more space, you may use Form 4562.

Note: If depreciation is computed by using the Class Life (ADR) System for assets placed in service after December 31, 1970, or the Guideline Class Life System for assets placed in service before January 1, 1971, you must file Form 4832 (Class Life (ADR) System) or Form 5006 (Guideline Class Life System). Except as otherwise expressly provided in income tax regulations sections 1.167(a)-11(b)(5)(vi) and 1.167(a)-12, the provisions of Revenue Procedures 62-21 and 65-13 are not applicable for taxable years ending after December 31, 1970 (See Publication 534.)

If you elected the Class Life (ADR) System this taxable year, check this box . . . ☐

If you elected the Guideline Class Life System this taxable year, check this box . . . ☐

a. Group and guideline class or description of property	b. Date acquired	c. Cost or other basis	d. Depreciation allowed or allowable in prior years	e. Method of computing depreciation	f. Life or rate	g. Depreciation for this year
55 Total additional first-year depreciation (do not include in items below) →						
56 Depreciation from Form 4832	(See Note above)					
57 Depreciation from Form 5006						
58 Other depreciation:	— 1974	40.00	4.00	ST. LINE	10	4.00
Buildings	JULY 1975	42.00	0	ST. LINE	10	2.10
Furniture and fixtures						
Transportation equipment						
Machinery and other equipment	1974	105 - 15 = 90	9.00	ST. LINE	10	9.00
Other (specify):						
FENCE	1974	55.00	11.00	ST. LINE	5	11.00
59 Totals			Enter here and in Part II, line 52 ►			26.10

Part IV **Farm Income—Accrual Method** (Do not include sales of livestock held for draft, breeding, sport, or dairy purposes; report such sales on Form 4797 and omit them from "On hand at beginning of year" column)

Description (Kind of livestock, crops, or other products)	On hand at beginning of year		Purchased during year		Raised during year	Consumed or lost during year	Sold during year		On hand at end of year	
	Quantity	Inventory value	Quantity	Amount paid	Quantity	Quantity	Quantity	Amount received	Quantity	Inventory value
		$		$				$		$
60 Totals (enter here and in Part V below)		$ (Enter on line 70)		$ (Enter on line 71)				$ (Enter on line 62)		$ (Enter on line 61)

Part V **Summary of Income and Deductions—Accrual Method**

61 Inventory of livestock, crops, and products at end of year . . . $

62 Sales of livestock, crops, and products during year . . . $

63 Agricultural program payments: (a) Cash . . .

(b) Materials and services . . .

64 Commodity credit loans under election (or forfeited) . . .

65 Federal gasoline tax credit . . .

66 State gasoline tax refund . . .

67 Other farm income (specify): . . .

68 Add lines 62 through 67 . . .

69 Total (add lines 61 and 68) . . . $

70 Inventory of livestock, crops, and products at beginning of year . . . $

71 Cost of livestock and products purchased during year . . .

72 Gross profits * (subtract the sum of lines 70 and 71 from line 69) . . . $

73 Total deductions from Part II, line 53 . . . $

74 Net farm profit or (loss) (subtract line 73 from line 72). Enter here and on Form 1040, line 32. **ALSO** enter on Schedule SE, Part I, line 1(a) . . . $

* Use amount on line 72 for optional method of computing net earnings from self-employment. (See Schedule SE, Part I, line 3.)

TAX MANAGEMENT
UNIT V

TEST

1. Match the terms on the right with the correct definition.

_____a. Person operating his own business

_____b. The dollar amount used to compute depreciation

_____c. Decline in value of an asset due to such causes as wear and tear, action of elements, obsolescence, and inadequacy

_____d. Items or resources owned

_____e. Value of an asset at the end of its useful life

_____f. Assessment taxes against real property, personal property, and public service property

_____g. Farm income received other than sale of crops and livestock

_____h. Animals bought for resale

_____i. Animals raised on a farm primarily for sale

_____j. A tax form used along with the 1040 form to complete farm income and expenses

_____k. Permits the taxpayer who receives an unusually large amount of income in one year to be taxed on this income as if it had been received over a five year period

1. Ad valorem tax
2. Self-employed
3. Salvage value
4. Schedule F
5. Purchased livestock
6. Market livestock
7. Depreciation
8. Assets
9. Tax basis
10. Other farm income
11. Income averaging

2. Name four reasons good records are important for tax management.

a.

b.

c.

d.

3. Match the following statements with the correct terms on the right.

_____a. If producing a crop that takes more than a year from planting to harvesting and selling, one may use the crop method of accounting: the expenses of producing the crop are deducted in the year of sale; profit or loss is not determined until the crop is harvested and sold

_____b. Use inventories of livestock crops, produce, feed, supplies, etc. to determine gross income; sales are treated as income when the price of the item is recoverable; expenses are deductible when payable

_____c. Income is reported in the year cash or its equivalent is received from the sales produce or property or for services performed; deductions for farm expense items are made in the year in which they are paid out

1. Cash method
2. Accrual method
3. Crop method

4. Match the proper method of reporting farm income on the right as they apply to each of the following advantages and disadvantages

Advantages:

_____a. Levels out income without the necessity of year-end manipulation

_____b. Most simple method

1. Cash method
2. Accrual method
3. Crop method

_____c. Most flexible as one can choose when to incur income and deduct expenses

_____d. Expenses of producing crop are deducted in the year of sale

_____e. One works with actual money rather than abstract figures

_____f. One has a close check on all operations due to the requirement of more accurate record keeping

Disadvantages:

_____g. Income may be erratic--An unusually good year could balloon income into a high tax bracket

_____h. Records are required to be complex and detailed

_____i. Each crop is considered a distinct venture with a separate account

_____j. In a low income year, allowable deductions and exemptions may be lost by having too little income

_____k. The actual cash position is difficult to determine

5. Distinguish between taxable and non-taxable items by placing a "T" by taxable items and "N" by non-taxable items.

_____a. Dividends received from business dealings

_____b. Income from royalities

_____c. Exchanges of business property

_____d. Income from interest

_____e. Rent income

_____f. Gasoline tax refunds

_____g. Government program payments

_____h. Social security benefits, railroad retirement pensions, and war veteran's disability pensions

_____i. Life insurance paid by reason of death

6. a. Select from the list below ways to avoid extremely high taxable income. Place an "X" by the correct statements.

   _____1) Pay debts

   _____2) Hire children

   _____3) Use slower depreciation

   _____4) Hold crops and livestock off market

   _____5) Collect accounts receivable

   b. Select from the list below ways to avoid extremely low taxable income. Place an "X" by the correct statements.

   _____1) Postpone debt payments

   _____2) Sell crops and livestock

   _____3) Use maximum initial depreciation

   _____4) Do additional custom work

   _____5) Make needed repairs

7. Match the method of depreciation with the proper definition on the right.

_____a. A fixed rate of depreciation is used every year and applies to the value of the asset at the beginning of the year

_____b. Yearly depreciation consists of dividing total anticipated depreciation by the number of years asset is expected to last

_____c. An additional 20 percent first year depreciation on new or used tangible personal property may be used if proper provisions are met

1. Straight line
2. Diminishing balance
3. Sum-of-the-digits method
4. Additional first year depreciation

_____d. Annual depreciation is determined by multiplying a fraction times the amount to by depreciated

8. Determine the annual depreciation of the following item by using the straight line method.

   a. Original cost--$1,000.00

   b. Expected life--10 years

   c. Projected salvage value--$100.00

   d. Annual depreciation__________________

9. Select from the list below those who must file an income tax return. Place an "X" by the proper answers.

_____a. A single individual under 65 years of age having $2,050 or more gross income for the year

_____b. Any individual who may be claimed as the dependent of another tax payer must file a return if gross income is $600 or more

_____c. Married persons under age 65 having the combined gross income of $2,800 per year provided a joint return is used

_____d. Self-employed persons having net earnings from self-employment of $350 per year

10. Complete schedule F and transfer information to a 1040 form when given an assimulated situation.

    (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity should be completed.)

TAX MANAGEMENT
UNIT V

ANSWERS TO TEST

1. a. 2

   b. 9

   c. 7

   d. 8

   e. 3

   f. 1

   g. 10

   h. 5

   i. 6

   j. 4

   k. 11

2. Any four of the following:

   a. Records identifying receipts make it possible to substantiate the fact that some of these receipts are from a source which makes them non-taxable

   b. If expenses are not recorded at the time they are incurred or paid, some may be overlooked or forgotten when preparing a tax return

   c. The cost of farm assets should be recorded so the depreciation allowance can be determined

   d. Upon audit of an income tax return by the Internal Revenue Service, good records are needed to verify the items reported

   e. If records show the date an asset was acquired, for what it was used, and whether it was sold, traded, destroyed, or otherwise disposed of, capital gains provisions of the law or 100 percent loss provisions can sometimes be claimed

   f. Records are valuable for efficient farm management and provide a basis for analyzing a business and for obtaining credit

   g. Records should establish the amount of earnings to be reported for self-employment social security tax purposes

3. a. 3

b. 2

c. 1

4. a. 2

b. 1

c. 1

d. 3

e. 1

f. 2

g. 1

h. 2

i. 3

j. 1

k. 2

5. a. T

b. T

c. N

d. T

e. T

f. T

g. T

h. N

i. N

6. a. 1)

2)

4)

b. 1)

2)

4)

7. a. 2

b. 1

c. 4

d. 3

8. $90

9. a

10. Evaluated to the satisfaction of the instructor.

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

TERMINAL OBJECTIVES

After the completion of Unit VI the student should be able to name factors to be considered when selecting machinery and equipment, apply the rule for determining theoretical capacity, and list general rules that affect field efficiency. Using an alignment chart, he should be able to determine the capacity of a machine, estimate operating cost, and estimate the annual fixed cost of machinery. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with machinery and equipment management to the proper definition.
2. Name the factors to be considered when selecting machinery and equipment.
3. Match the kinds of costs involved in owning and operating any piece of machinery to the correct terms.
4. Select from a list the factors that determine the size of equipment to buy.
5. Match the type machine with the expected mechanical life hours of each.
6. Apply the rule for determining the theoretical capacity of a machine.
7. List general rules that affect field efficiency.
8. Match the type field operation with the typical field efficiency.
9. Apply the rule for estimating the required effective field capacity for a machine to perform a specific operation.
10. Determine the required capacity of a machine using an alignment chart.
11. Estimate the machine capacity using an alignment chart.
12. Estimate the operating cost of machinery using an alignment chart.
13. Estimate annual fixed cost of machinery using an alignment chart.

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Alignment Chart for Estimating Proper Machine Capacity
    - TM 2--Alignment Chart for Estimating Machine Capacity
    - TM 3--Alignment Chart for Estimating Operating Cost
    - TM 4--Annual Average Fixed Cost As a Percent of Initial List Price
    - TM 5--Alignment Chart for Estimating Annual Fixed Cost
4. Assignment sheets
    - #1--Determining the Required Capacity of a Machine
    - #2--Estimating the Machine Capacity
    - #3--Estimating the Operating Cost of Machinery
5. Answers to assignment sheets
6. Test
7. Answers to test

References:

1. Bowers, Wendell. Workbook for Machinery Management. Agricultural Engineering Department, Oklahoma State University, Stillwater, Oklahoma.

2. Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc., 1971.

3. Hamilton, James E. and W. R. Bryant. Profitable Farm Management Englewood, New Jersey: Prentice-Hall, Inc., 1963.

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

INFORMATION SHEET

I. Terms and definitions

   A. Theoretical capacity--Rate, in acres per hour, which a machine is working when no time is lost due to turns, unused width, stopping, plugging, and breakdowns

   B. Field efficiency--Ratio of the actual capacity of a machine to its ideal or theoretical capacity

II. Factors to be considered when selecting machinery and equipment

   A. Reliability of manufacturer

   B. Parts and service available from dealer

   C. Adaptation of machine to needs

   (NOTE: Consider size, attachments, and simplicity of design.)

   D. Price and quality of machine

   E. Availability of fuel used on engine-driven machines

   F. Ease of making adjustments and minor repairs

   G. Design and neatness of appearance

   H. Added investment should be offset by reducing the required labor or permitting the labor to be used more productively

   I. Resale or salvage value

III. Kinds of costs involved in owning the operating any piece of machinery

   A. Fixed costs--Include depreciation, taxes, insurance, and interest on investment

   (NOTE: These costs will occur whether you use the machinery or not.)

   B. Variable costs--Operating costs which include repair bills, maintenance, gas, oil and/or lubrication, and general upkeep

   (NOTE: These costs are involved in the actual operation of the machinery or equipment.)

INFORMATION SHEET

IV. Factors that determine the size of equipment to buy

A. Size and type of farming operation

B. Soil type and topography

C. Labor available

D. Capital available

E. Skill of the operator

F. Number of days in the season available to use this machine

V. Expected mechanical life hours

A. Wheel tractors--12,000 hours

B. Combines--2,000 hours

C. Corn pickers--1,500 hours

D. Grain drills--1,000 hours

E. Plows-- 2,000 hours

F. Mowers--1,000 hours

G. Balers--2,000 hours

H. Forage harvesters--1,500 hours

I. Discs--2,000 hours

J. Cultivators--2,000 hours

K. Swathers--1,500 hours

(NOTE: On some machines the number of hours to reach the minimum average cost per hour may be less than the expected mechanical life.)

VI. Rule for determining the theoretical capacity--Theoretical Capacity (acres per hour) equals $\frac{\text{Speed (mph) x Width (feet)}}{8.25}$

(NOTE: 8.25 represents a conversion factor which permits one to multiply mph times width and come out with acres per hour.

$$\frac{\text{43,560 sq. ft. per acre}}{\text{5,280 ft/mile}} = 8.25$$

Example: The theoretical capacity of a 10-foot self-propelled windrower traveling 4 mph

$$\frac{\text{4 mph x 10 feet}}{8.25} = \text{4.85 acres per hour}$$

(NOTE: Speed (miles per hour) = $\frac{\text{Distance traveled (feet)}}{\text{Time (minutes) x 88}}$)

INFORMATION SHEET

VII. General rules that affect field efficiency

A. A normal turn at end of row should be made with one continuous motion

(NOTE: The time to make a turn with a row crop operation depends mainly on the width of the available turning space and the ground surface conditions.)

B. When space at the end is too narrow for a complete turn and requires backing for completion, as much as 50 percent more time will be required

C. If there is no space at the end for a turn and the entire operation must be completed by backing, turning time may be two and one-fourth times that of a normal turn

D. Other increases include 11 percent for a rough field condition, 29 percent for obstructions and 25 percent for ditches

E. Operators can increase field efficiencies by 10 percent or more by simply trying to eliminate unnecessary time the implement is down at the end of a furrow or row

VIII. Typical field efficiencies

OPERATION	FIELD EFFICIENCIES
A. Tillage (plowing, discing, and cultivating)	65-85%
B. Planting	45-75%
C. Drilling	65-80%
D. Combining, cotton stripping, baling	60-75%
E. Mowing, raking, conditioning, and swathing	65-85%
F. Spraying	55-65%

IX. Estimating the required effective field capacity--Effective field capacity equals

$$\frac{\text{Speed (mph)} \times \text{Width (feet)}}{8.25} \times \frac{\text{Field Efficiency}}{100}$$

Example: The effective field capacity for a 10-foot self-propelled windrower traveling 4 mph with a 70 percent field efficiency

$$\frac{4 \times 10}{8.25} \times \frac{70\%}{100} = \frac{4 \times 10 \times .70}{8.25} = 3.4 \text{ acres per hour}$$

INFORMATION SHEET

X. Determining the required capacity of a machine using an alignment chart

A. In order to determine the required capacity of a machine use the enclosed chart

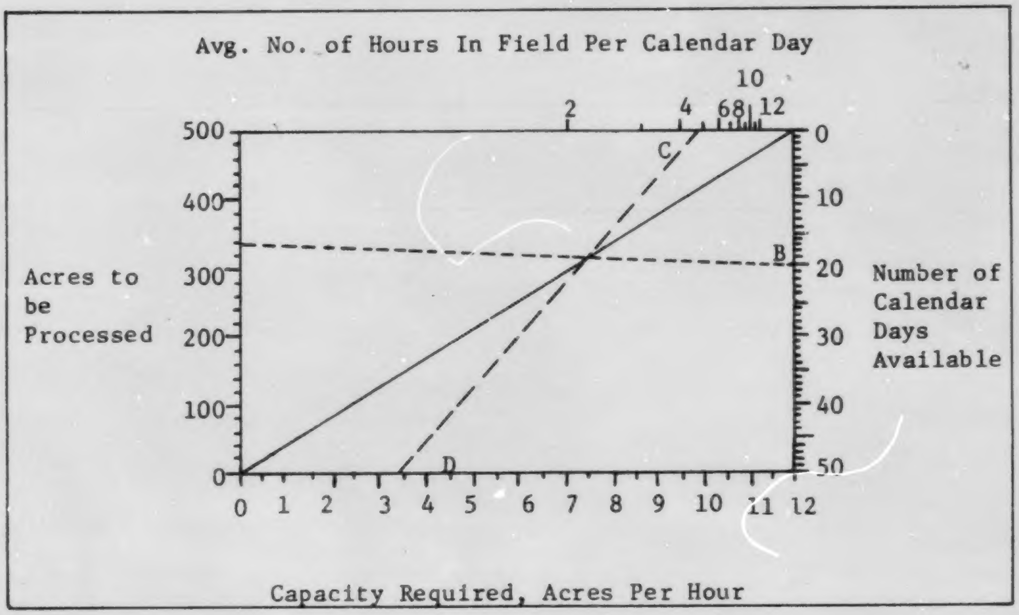
B. Draw a straight line from the number of acres to be processed to the number of calendar days in which the process must be completed

C. Draw a second line from the average number of working hours available per calendar day and the point of intersection of the first line and theturning line

D. The second line will then intersect the bottom scale to show the required effective capacity in acres per hour

Example: 340 acres of land is to be prepared for wheat seeding and it is desired to use the smallest size of one-way plow that can be used if the ground is to be worked between the dates of September 1 and September 20; during the 20 days no more than 100 hours is available for working in the field, due to Sundays and bad weather. This is an average of 5 hours in the field for each calendar day. The required capacity as shown on the chart is approximately 3.5 acres per hour

CHART FOR ESTIMATING PROPER MACHINERY CAPACITY



INFORMATION SHEET

XI. Estimating the capacity of a machine by using an alignment chart

A. Use the chart enclosed

B. Draw a straight line from the speed of machine to the correct field efficiency percent

(NOTE: Field efficiency data is included in earlier information within this unit.)

C. Draw a second line from the machine width through the point of intersection of the first line and the turning line

D. Second line will then intersect the bottom scale to show the estimated capacity of the machine

E. If proper width needs to be determined in order to reach a given capacity, use the same alignment chart and the following steps

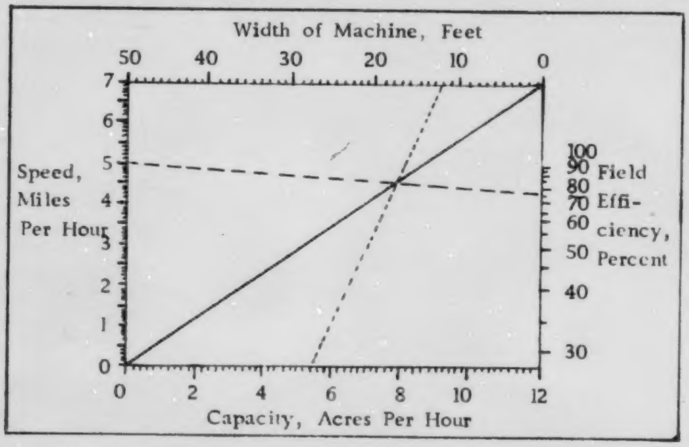
1. Draw straight lines from the speed of travel to the correct field efficiency

2. Draw a second line from the desired capacity (acres per hour) through the point of intersection of the first line and the truning line

3. The second line will then intersect the top scale to show the needed width

Example: A machine traveling 5 mph with a 75 percent field efficiency and a needed capacity of 5.5 acres per hour would have to be how wide? By using the chart enclosed it can be determined that the machine needs to be 12 feet wide.

ALIGNMENT CHART
FOR ESTIMATING
MACHINE CAPACITY



INFORMATION SHEET

XII. Estimating operating cost of machinery by using an alignment chart

A. Use the enclosed chart

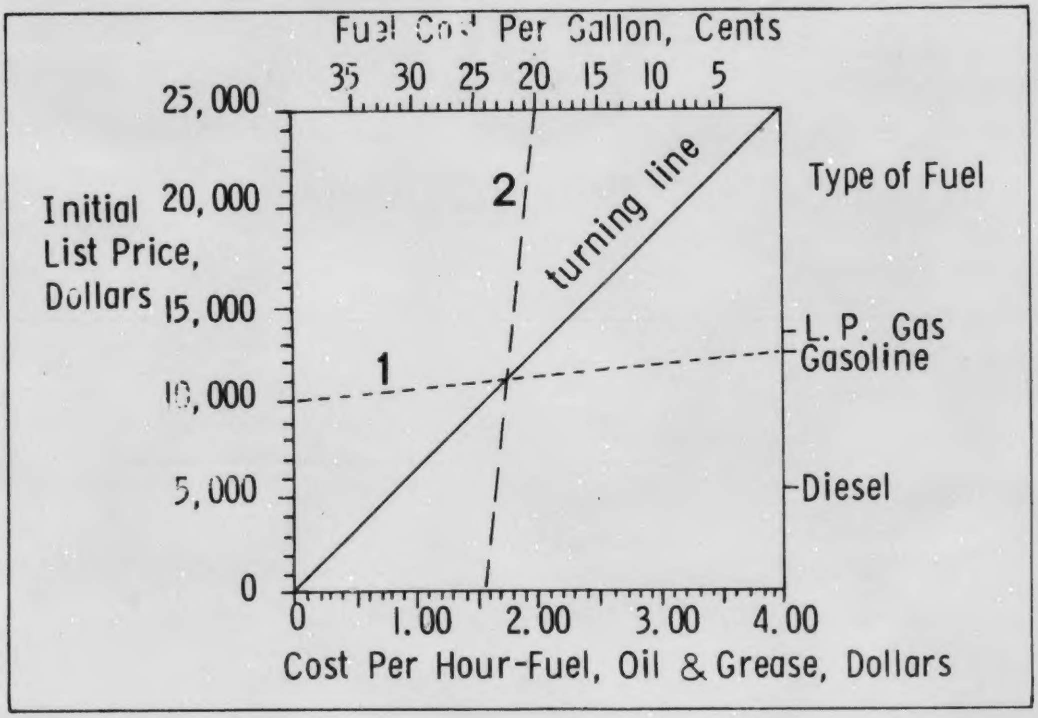
B. Draw a straight line from the initial list price of the machine to the type of fuel used

C. Draw a second line from the fuel cost per gallon and the point of intersection of the first line and the turning line

D. The second line will then intersect the bottom scale to show the cost per hour of fuel, oil, and grease

Example: A gasoline tractor costs $10,000 and has a fuel cost of twenty cents per gallon. By using the chart below it is estimated that the operating cost would be $1.60 per hour.

ALIGNMENT CHART FOR ESTIMATING OPERATING COST



INFORMATION SHEET

XIII. Estimating annual fixed cost by using an alignment chart

A. Use the enclosed charts (transparencies 4 and 5)

B. Determine average annual fixed cost percent by using chart #1

C. Draw a straight line from indicated mark on left margin to the predetermined annual fixed cost percent

D. Draw a second line from the initial list price and the point of intersection of the first line and the turning line

E. The second line will then intersect the bottom scale to show the average annual fixed cost

Chart #1

ALIGNMENT CHART FOR ESTIMATING ANNUAL FIXED COST

Number of Years Owned Since New	All Tractors	Combines	Forage Harvesters & Balers	Swathers	All Others
1	32.8	37.3	43.1	36.3	40.3
2	22.1	24.5	26.8	24.4	25.8
3	18.3	19.8	21.0	20.0	20.5
4	16.1	17.1	17.8	17.4	17.6
5	14.7	15.4	15.7	15.6	15.6
6	13.6	14.1	14.1	14.3	14.2
7	12.8	13.0	12.9	13.2	13.0
8	12.0	12.1	12.0	12.3	12.1
9	11.4	11.4	11.1	11.5	11.3
10	10.9	10.7	10.4	10.8	10.6
11	10.4	10.1	9.8	10.2	9.9
12	10.0	9.6	9.2	9.6	9.4

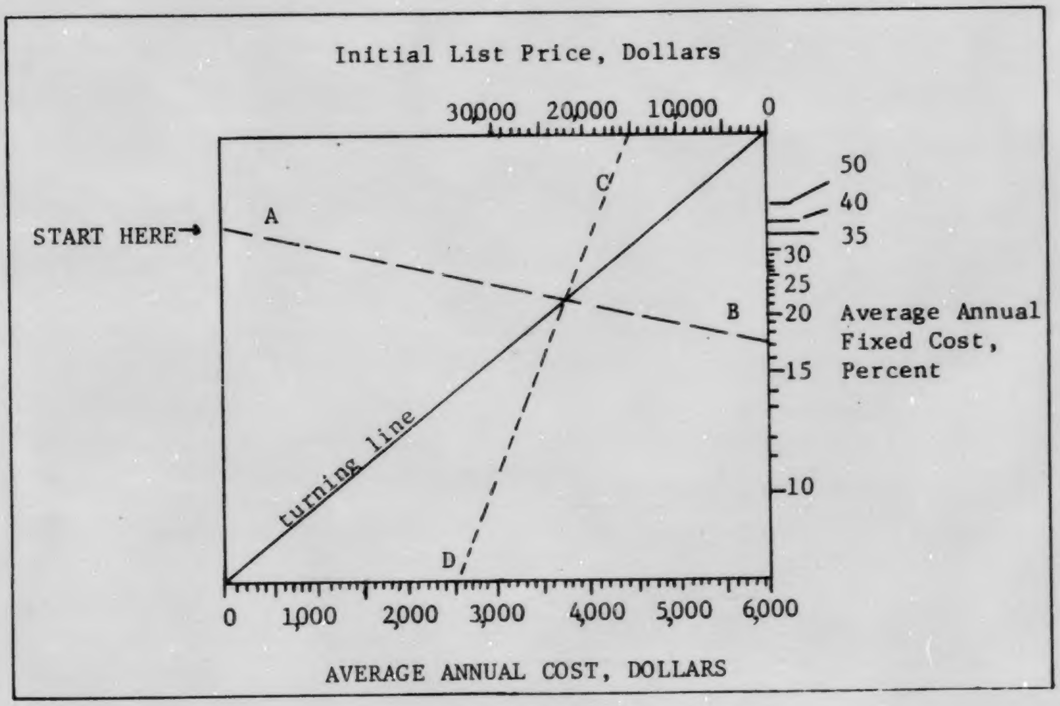
*Includes depreciation, taxes, housing, insurance and interest. It is further assumed that the machine was sold at 10% less than initial list price and a credit for depreciation is given for income tax purposes.

INFORMATION SHEET

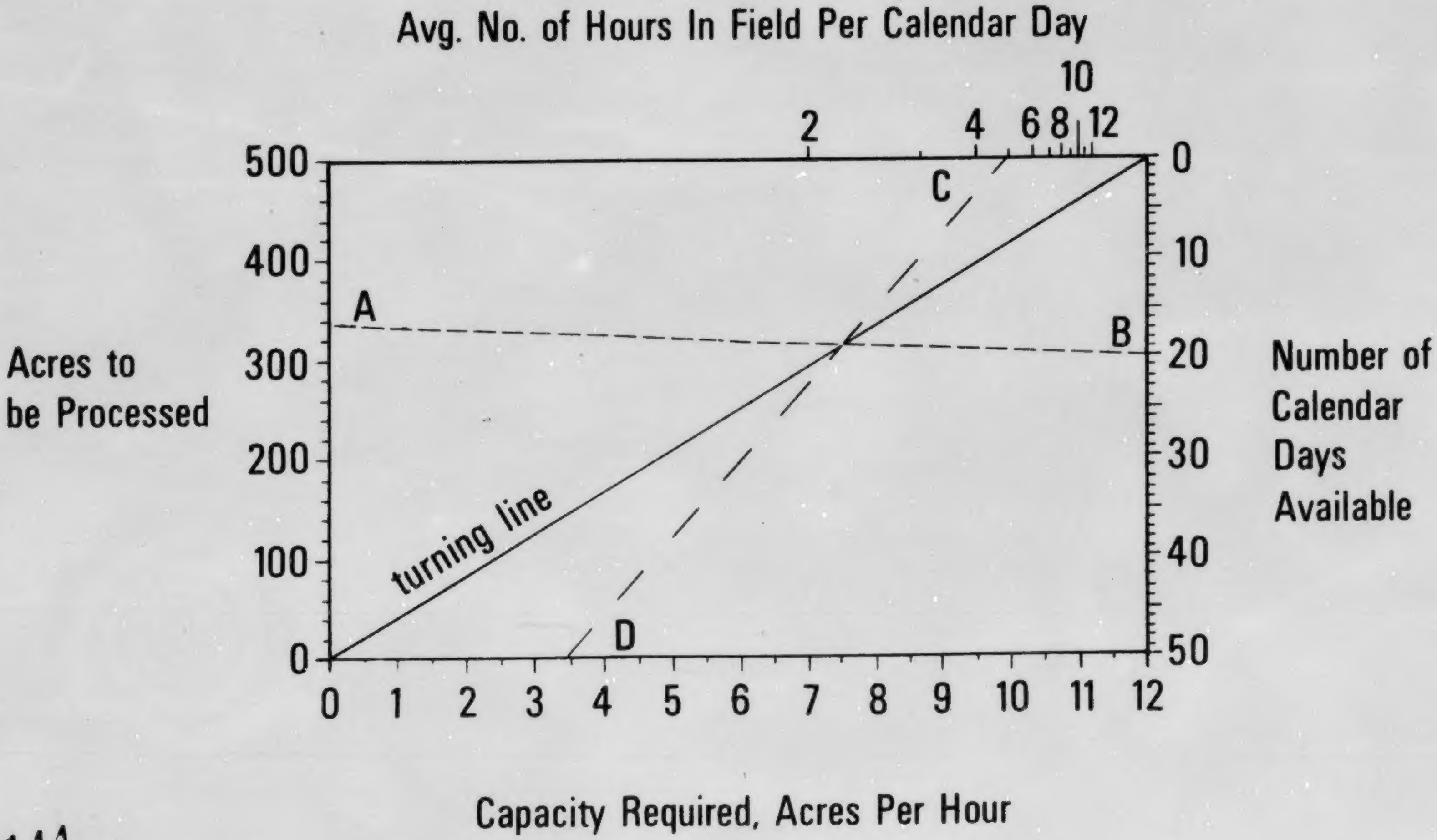
Chart #2

Example: A tractor has a 17 percent average annual fixed cost and an initial list price of $15,000. By using chart #2 it can be estimated that the average annual fixed cost will be $2,500.

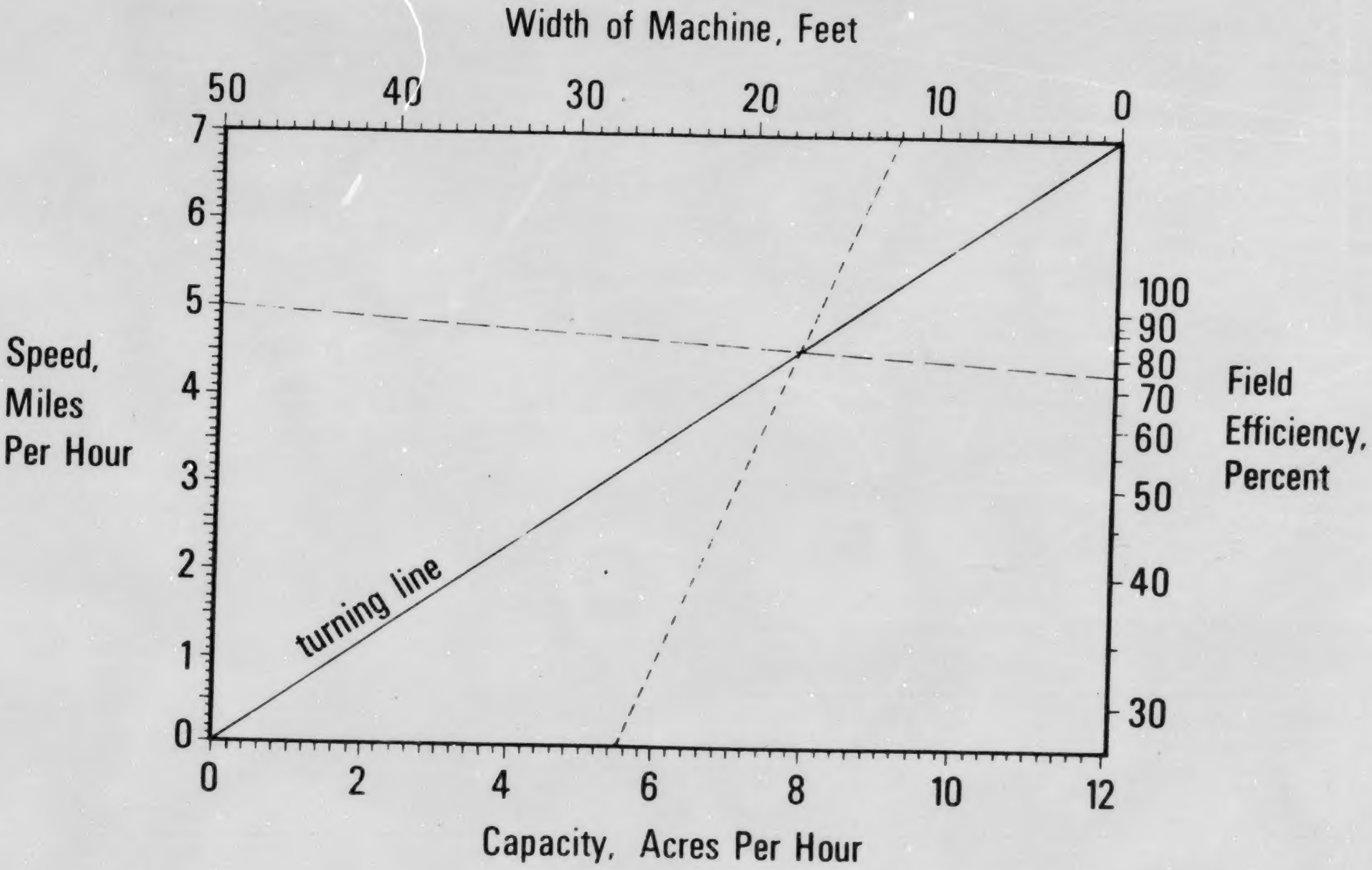
ALIGNMENT CHART FOR ESTIMATING OPERATING COST



Alignment Chart for Estimating Proper Machine Capacity

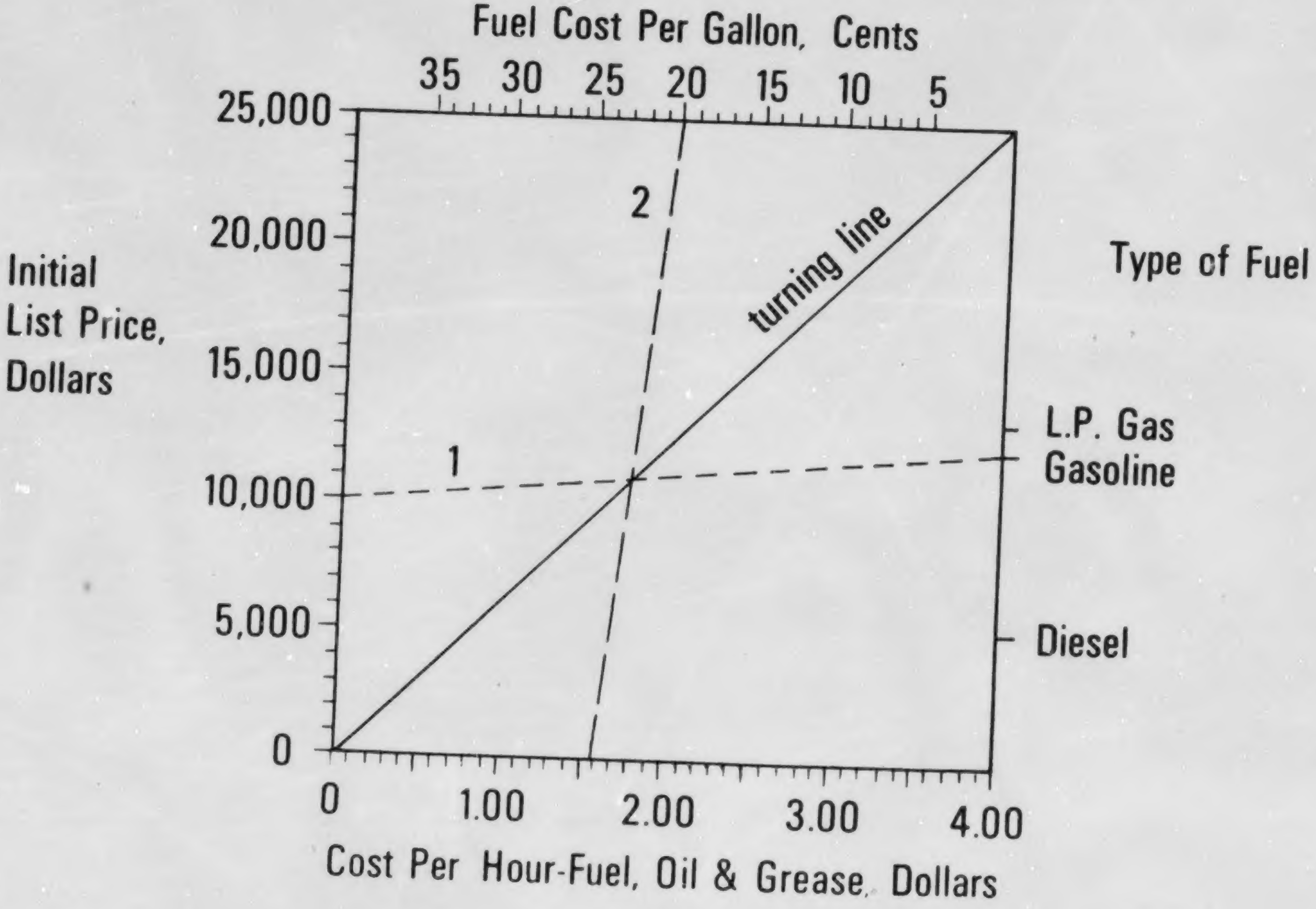


Alignment Chart for Estimating Machine Capacity



Alignment Chart for Estimating Operating Cost

TRACTORS, COMBINES, BALERS, FORAGE HARVESTERS, SWATHERS

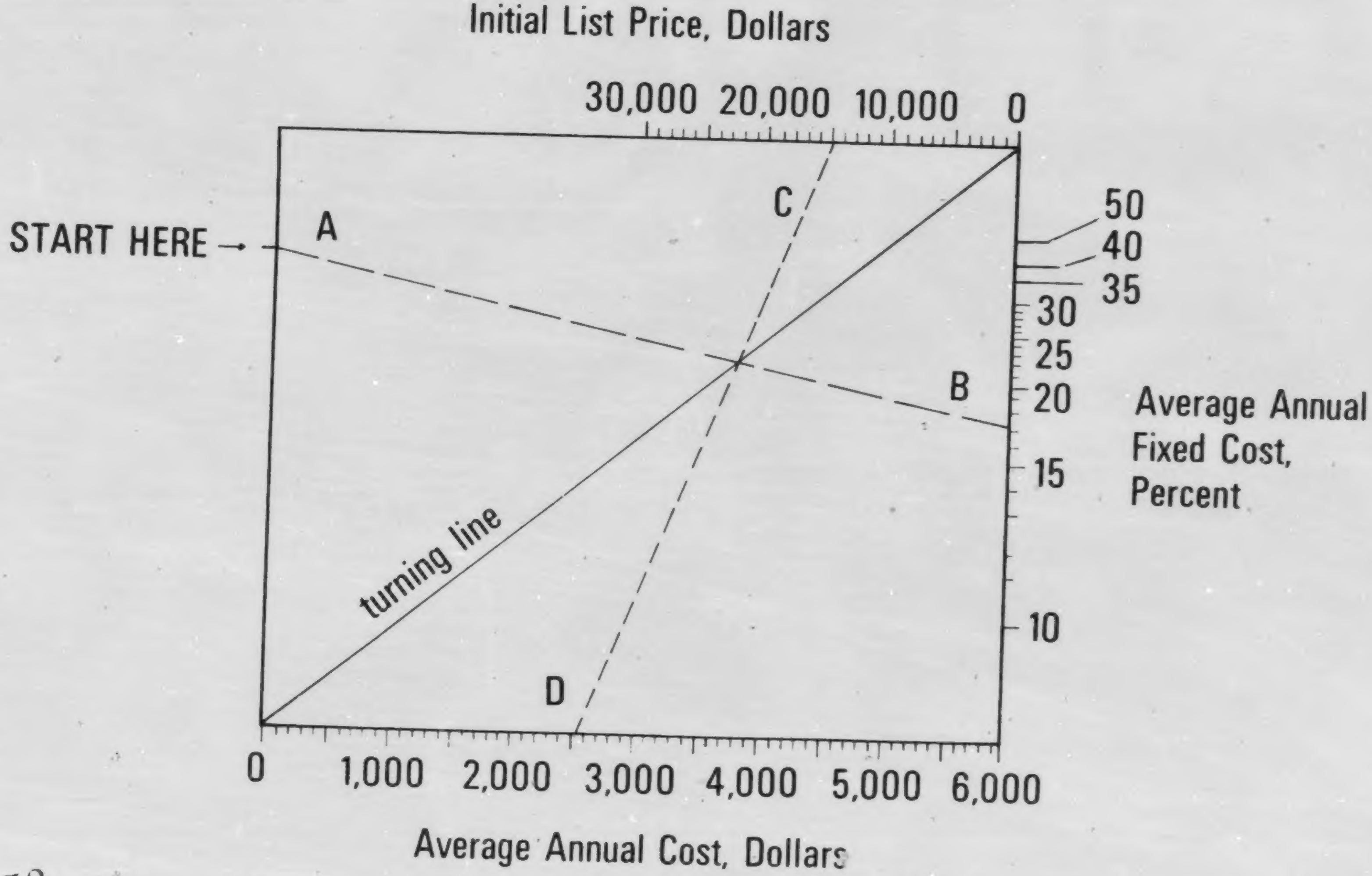


Annual Average Fixed Cost
As A Percent of Initial List Price

Number of Years Owned Since New	All Tractors	Combines	Forage Harvesters & Balers	Swathers	All Others
1	32.8	37.3	43.1	36.3	40.3
2	22.1	24.5	26.8	24.4	25.8
3	18.3	19.8	21.0	20.0	20.5
4	16.1	17.1	17.8	17.4	17.6
5	14.7	15.4	15.7	15.6	15.6
6	13.6	14.1	14.1	14.3	14.2
7	12.8	13.0	12.9	13.2	13.0
8	12.0	12.1	12.0	12.3	12.1
9	11.4	11.4	11.1	11.5	11.3
10	10.9	10.7	10.4	10.8	10.6
11	10.4	10.1	9.8	10.2	9.9
12	10.0	9.6	9.2	9.6	9.4

*Includes depreciation, taxes, housing, insurance, and interest. It is further assumed that the machine was sold at 10% less than initial list price and a credit for depreciation is given for income tax purposes.

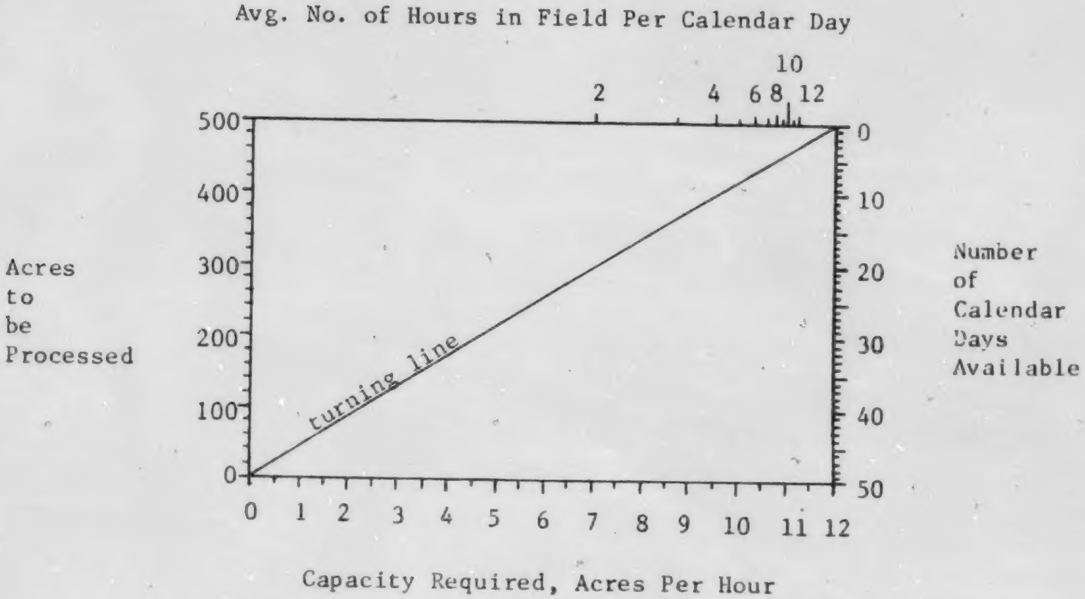
Alignment Chart for Estimating Annual Fixed Cost



MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ASSIGNMENT SHEET #1--DETERMINING THE REQUIRED CAPACITY OF A MACHINE

Work each of the problems below. Use the alignment chart enclosed.



ASSIGNMENT SHEET #1

1. A farmer has 200 acres of land to plow in 15 days. He works 6 hours per day. How many acres per hour must he plow?

   Answer:________________

2. How many acres per hour capacity is needed to combine 300 acres of wheat in 15 calendar days averaging 6 hours per day.

   Answer:________________

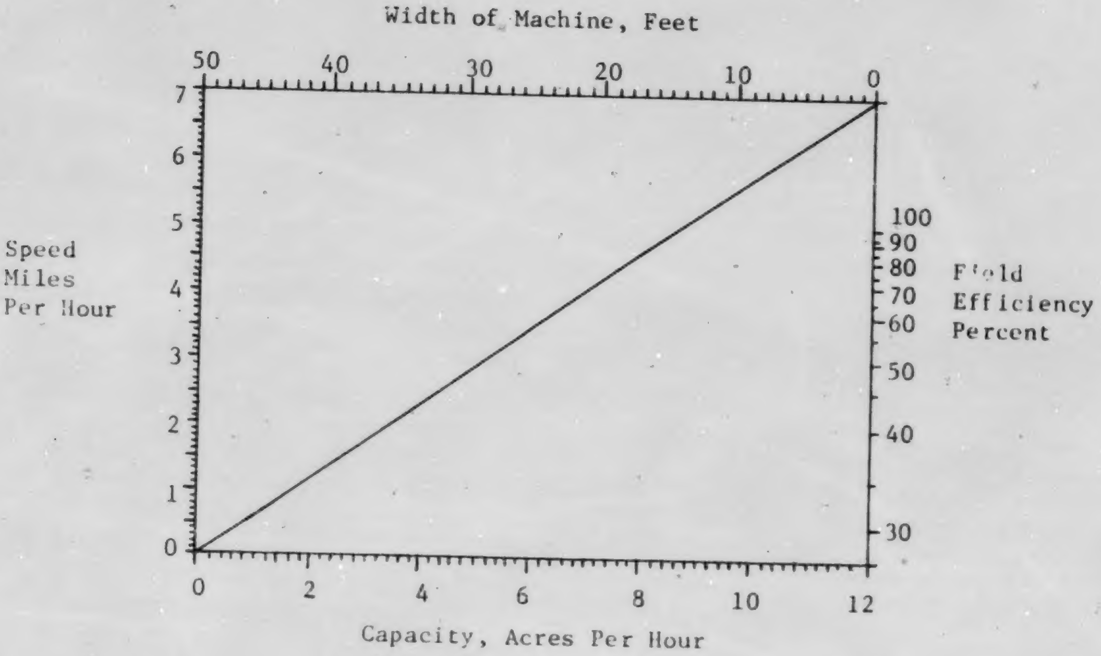
3. How many hours per day must you work if you plow 200 acres in 10 days at a rate of 3 acres per hour?

   Answer:________________

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ASSIGNMENT SHEET #2--ESTIMATING THE MACHINE CAPACITY

Using the alignment sheet below, work each of the following problems



ASSIGNMENT SHEET #2

1. What machine width would be necessary when desiring to plow 5.5 acres per hour, using a machine that travels 5 mph and has a 75 percent field efficiency?

   Answer:________________

2. How many acres per hour could be plowed if you are traveling 4 mph with a 10 foot plow that has a 70 percent field efficiency?

   Answer:________________

3. In problem #2 how many acres per hour could be plowed if travel speed was increased to 6 mph?

   Answer:________________

4. Your own problem.

   (NOTE: Use a machine on your farm or one given by the instructor.)

   Machine________________

   Speed________________mph

   Width________________feet

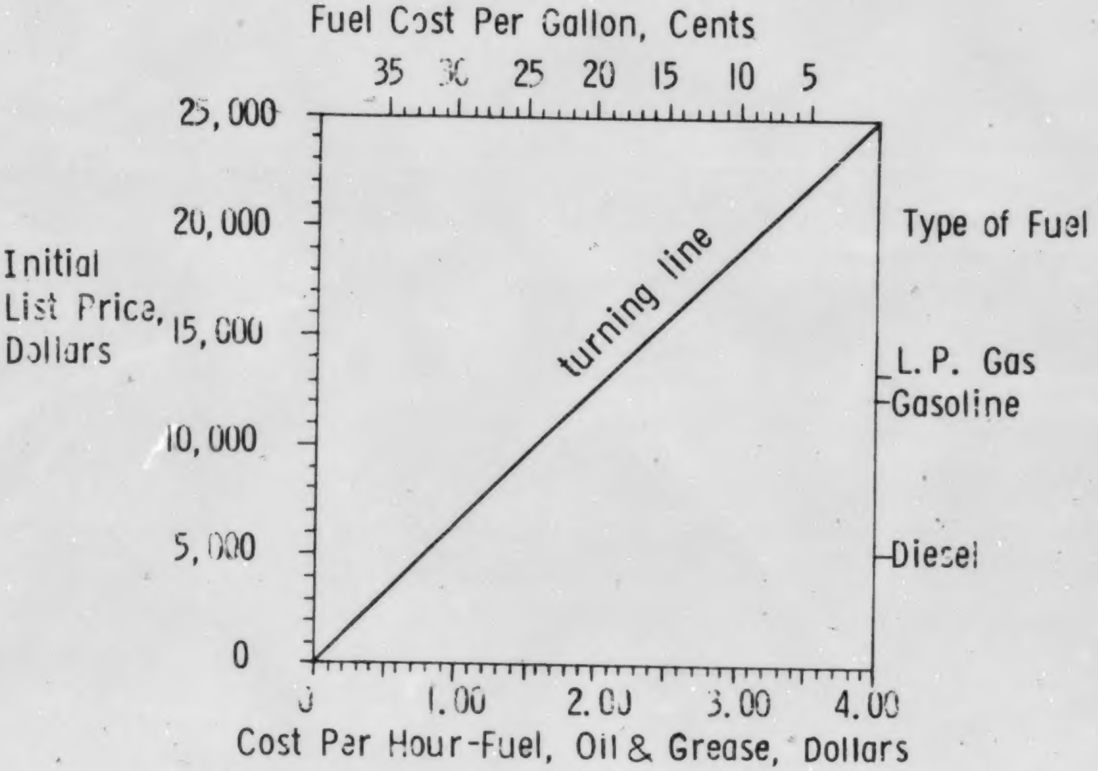
   Field efficiency__________percent

   Actual capacity__________acres per hour

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ASSIGNMENT SHEET #3--ESTIMATING THE OPERATING COST OF MACHINER

Using the alignment chart below, work each of the following problems



ASSIGNMENT SHEET #3

1. If gasoline costs 20¢ per gallon, what is the average cost per hour for fuel and lubricants for a gasoline tractor with an initial list price of $10,000?

2. If LP gas costs 11¢ per gallon, what is the average cost per hour for fuel and lubricants for a LP gas tractor with an initial list price of $10,000?

3. If diesel costs 15¢ per gallon, what is the average cost per hour for fuel and lubricants for a diesel tractor with an initial list price of $10,000?

4. Your own problem.

   (NOTE: Use a tractor on your own farm or one given by the instructor.)

   Machine cost__________

   Fuel type__________

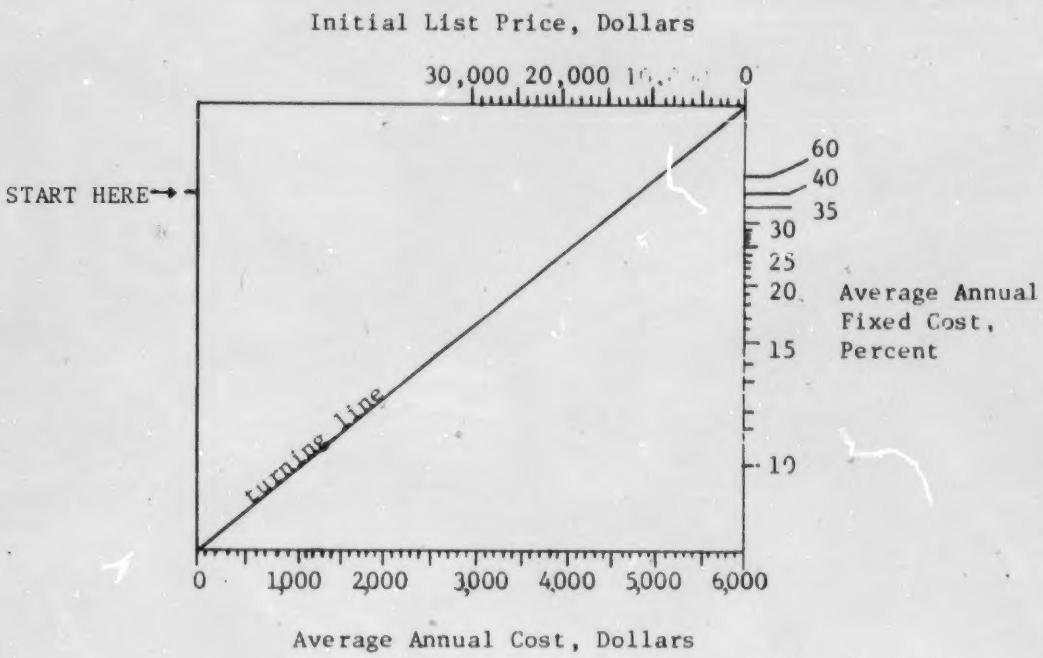
   Fuel cost per gallon__________

   Cost per hour for fuel and lubricants__________

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ASSIGNMENT SHEET #4--ESTIMATING ANNUAL FIXED COST OF MACHINERY

Using the alignment chart below, work each of the following problems



MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

1. 2.25 acres per hour
2. 3.45 acres per hour
3. 7 hours

Assignment Sheet #2

1. 12 feet
2. 3.4 acres per hour
3. 5.2 acres per hour
4. To be completed by student

Assignment Sheet # 3

1. $1.60
2. $.95
3. $.80
4. To be completed by student

Assignment Sheet # 4

1. $1,300
2. $800
3. $3,100
4. To be completed by student

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

TEST

1. Match the terms on the right to the proper definition.

_____a. Rate, in acres per hour, which a machine is working when no time is lost due to turns, unused width, stopping, plugging, and breakdowns

_____b. Ratio of the actual capacity of a machine to its ideal or theoretical capacity

1. Field efficiency
2. Theoretical Capacity

2. Name five factors to be considered when selecting machinery and equipment.

a.

b.

c.

d.

e.

3. Match the kinds of costs involved in owning and operating any piece of machinery to the correct term or terms.

_____a. Depreciation

_____b. Interest on investment

_____c. Repair bills

_____d. Gas

_____e. Taxes

_____f. General upkeep

_____g. Insurance

1. Variable costs
2. Fixed costs

4. Select from the list below the factors that determine the size of equipment to buy. Place an "X" by the correct factor.

_____a. Labor available

_____b. Soil type and topography

_____c. Distance from dealer

_____d. Capital available

_____e. Season of the year

_____f. Size and type of farming operation

5. Match the expected life hours on the right with the type of machine on the left.

_____a. Balers

_____b. Discs

_____c. Cultivators

_____d. Swathers

_____e. Forage harvesters

_____f. Wheel tractors

_____g. Mowers

_____h. Plows

_____i. Grain drills

_____j. Combines

1. 1,200 hours
2. 2,000 hours
3. 1,500 hours
4. 1,000 hours
5. 12,000 hours

6. Determine the theoretical capacity of a 20-foot self-propelled combine that travels 3 mph by applying the following rule:

$$\frac{\text{Speed x Width}}{8.25} = \text{Acres per hour}$$

7. List three general rules that affect field efficiency.

a.

b.

c.

8. Match the type field operation on the left with the typical field efficiency.

_____a. Planting

_____b. Tillage (Plowing, discing, and cultivating)

_____c. Drilling

_____d. Combining, and baling

_____e. Mowing, raking, conditioning, and swathing

_____f. Spraying

1. 65-85%
2. 45-75%
3. 65-80%
4. 60-75%
5. 55-65%

9. Apply the following rule for estimating the effective field capacity for a 12-foot plow that has a 60 percent field efficiency and is traveling 4 mph.

Rule: $\frac{\text{Speed x Width}}{8.25} \times \frac{\text{Field Efficiency}}{100} = \underset{8.25}{\text{Effective Field Capacity}}$

10. Determine the required capacity of a machine using an alignment chart.

11. Estimate the machine capacity using an alignment chart.

12. Estimate the operating cost of machinery using an alignment chart.

13. Estimate the annual fixed cost of machinery using an alignment chart.

(NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

MACHINERY AND EQUIPMENT MANAGEMENT
UNIT VI

ANSWERS TO TEST

1. a. 2

   b. 1

2. Any five of the following:

   a. Reliability of manufacturer

   b. Parts and service available from dealer

   c. Adaptation of machine to needs

   d. Price and quality of machine

   e. Availability of fuel used on engine-driven machines

   f. Ease of making adjustments and minor repairs

   g. Design and neatness of appearance

   h. Added investment should be offset by reducing the required labor or permitting the labor to be used more productively

   i. Resale or salvage value

3. a. 2

   b. 2

   c. 1

   d. 1

   e. 2

   f. 1

   g. 2

4. a

   b

   d

   f

5. a. 2
   - b. 2
   - c. 2
   - d. 3
   - e. 3
   - f. 5
   - g. 4
   - h. 2
   - i. 4
   - j. 2

6. $\frac{3 \text{ mph} \times 20 \text{ feet}}{8.25} = 7.27$ acres per hour

7. Any three of the following:

   a. A normal turn at end of row should be made with one continuous motion

   b. When space at the end is too narrow for a complete turn and requires backing for completion, as much as 50 percent more time will be required

   c. If there is no space at the end for a turn and the entire operation must be completed by backing, turning time may be two and one-fourth times that of a normal turn

   d. Other increases include 11 percent for a rough field condition, 29 percent for obstructions, and 25 percent for ditches

   e. Operators can increase field efficiencies by 10 percent or more by simply trying to eliminate unnecessary time the implement is down at the end of a furrow or row

8. a. 2
   - b. 1
   - c. 3
   - d. 1
   - e. 5

9. $\frac{4 \times 12}{8.25} \times \frac{60}{100}$ = 3.47 acres per hour

10. Evaluated to the satisfaction of the instructor.

11. Evaluated to the satisfaction of the instructor.

12. Evaluated to the satisfaction of the instructor.

13. Evaluated to the satisfaction of the instructor.

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

TERMINAL OBJECTIVES

After the completion of Unit VII, the student should be able to select from a list the advantages and disadvantages of custom service. He should be able to determine custom work rates, the feasibility of machinery ownership, and the number of acres a machine must be used to break even with the present custom rate. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to machinery and equipment management with the proper definitions.
2. Select from a list the advantages and disadvantages of custom service.
3. Apply the rule for determining the annual fixed cost.
4. Apply the rule for determining fuel cost per acre.
5. Apply the rule for determining repair cost per acre.
6. Apply the rule for determining labor cost per acre.
7. Determine custom work rates when given a custom work rate table.
8. Determine if it is cheaper to own a machine or hire the custom operator.
9. Determine the number of acres a machine must be used to break even with the present custom rate.

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Assignment sheets
    - #1--Determine Custom Work Rates
    - #2--Determine Cost of Custom Hiring Versus Ownership
    - #3--Determine Break-Even Points
4. Test
5. Answers to test

References:

1. K.S.U., Extension Service, K.S.U. Farm Management Guides, XMF-253 XMF-254, XMF-256, XMF-273, XMF-274.

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

INFORMATION SHEET

I. Terms and definitions

   A. Fixed costs--include depreciation, taxes, insurance, and interest on investments

      (NOTE: These costs will occur whether machine is used or not.)

   B. Variable costs--Operating costs which include repair bills, maintenance, gas, oil and/or lubrication, and general upkeep.

      (NOTE: These costs are involved in the actual operation of the machinery or equipment.)

II. Advantages and disadvantages of custom service

   A. Advantages

      1. Ownership costs are eliminated (Example - taxes, shelter costs, maintenance labor and tech. skill, insurance.)

      2. Capital can be invested in other enterprises

      3. Annual machinery cost can be varied to suit weather, yield, and market conditions of individual years

      4. There may be benefits from newer machinery, a skilled operator, and less time required

   B. Disadvantages

      1. Service may not be available when the job is ready

      2. Annual cost may be higher than ownership cost

      3. Labor released by hiring custom work may not be profitably used

      4. Custom operators may prefer large jobs and refuse or postpone small jobs

      5. Custom operators are sometimes interested in acres rather than efficiency

         Example: Operators often operate combine or swather too fast

      6. May influence decision as to potential rental of land

INFORMATION SHEET

III. Rule for determining the annual average fixed cost

A. List price times percent factor listed in chart below equals annual fixed cost

ALIGNMENT CHART FOR ESTIMATING ANNUAL FIXED COST AS A PERCENT OF INITIAL LIST PRICE

Number of Years Owned Since New	All Tractors	Combines	Forage Harvesters & Balers	Swathers	All Others
1	32.8	37.3	43.1	36.3	40.3
2	22.1	24.5	26.8	24.4	25.8
3	18.3	19.8	21.0	20.0	20.5
4	16.1	17.1	17.8	17.4	17.6
5	14.7	15.4	15.7	15.6	15.6
6	13.6	14.1	14.1	14.3	14.2
7	12.8	13.0	12.9	13.2	13.0
8	12.0	12.1	12.0	12.3	12.1
9	11.4	11.4	11.1	11.5	11.3
10	10.9	10.7	10.4	10.8	10.6
11	10.4	10.1	9.8	10.2	9.9
12	10.0	9.6	9.2	9.6	9.4

*Includes depreciation, taxes, housing, insurance and interest. It is further assumed that the machine was sold at 10% less then initial list price and a credit for depreciation is given for income tax purposes.

Example: A combine with a initial list price of $10,000.00 that has been owned five years since new would have an annual fixed cost of 15.4% x $10,000 or $1,540.00

B. $$\frac{\text{Annual ownership or fixed cost}}{\text{Acres of annual use}} = \text{Ownership cost per acre}$$

IV. Rule for determining fuel and libricant cost

A. $$\frac{\text{Initial list price}}{1000} \text{ X fuel price X fuel factor} = \text{Fuel cost per hour}$$

INFORMATION SHEET

B. Fuel and lubricant cost factors*

Equipment	Fuel cost multiplier		
	Gasoline	Diesel	L.P.G.
Two-wheel drive tractors	.79	.51	.87
Self-propelled combines	.79	.51	.87
Self-propelled swathers	.79	.51	.87
Hay baler with engine	.79	.51	.87
Forage harvester with engine	.79	.51	.87
Self-propelled cotton picker	.26	.18	.31
Trucks and pickups	1.15	.74	1.25
Four-wheel drive tractors	.53	.36	.61
Self-propelled forage harvesters	.53	.36	.61
Crawler tractors	.41	.29	.48
Feed truck with power box	.41	.29	.48

(NOTE: *These values are 15% larger than the fuel consumption multiplier. This allows for 15% of the fuel cost to cover the cost of lubricants and filters. Multiply these rates by the fuel price and the list price divided by $1,000 to obtain fuel and lubricant cost in dollars per hour. Fuel price is the actual cost per gallon after tax refunds and all rebates.)

C. $\frac{\text{Fuel cost per hour}}{\text{Acres per hour}}$ = Fuel cost per acre

V. Rule for determining repair cost

A. $\frac{\text{Initial list price}}{1,000}$ X Accumulated repair cost/$1000 of initial list price = Total accumulated repair cost

B. Accumulated repair cost per $1000 of initial list price

(Charts are listed on the following pages.)

INFORMATION SHEET

1. COMBINES

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year											
	1	2	3	4	5	6	7	8	9	10	11	12
25	0	0	1	2	2	3	5	6	8	9	11	14
50	0	2	3	6	9	12	16	21	27	33	40	47
75	1	3	7	12	18	25	34	44	55	68	82	98
100	2	5	11	19	30	42	57	74	93	114	138	165
125	2	8	17	29	44	63	85	110	139	171	207	246
150	3	11	24	40	62	87	118	153	193	237	287	342
175	4	15	31	53	81	115	155	202	254	313	378	451
200	5	19	40	68	104	147	198	256	323	398	*	*
225	6	23	49	84	128	181	244	317	399	*	*	*
250	8	28	59	101	155	219	295	383	*	*	*	*
275	9	33	70	120	184	260	351	455	*	*	*	*
300	11	39	82	141	215	305	410	*	*	*	*	*
350	14	51	108	186	284	402	*	*	*	*	*	*
400	18	65	138	236	361	*	*	*	*	*	*	*
450	22	80	170	292	446	*	*	*	*	*	*	*
500	27	97	206	353	*	*	*	*	*	*	*	*

2. SWATHERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of Annual use	Accumulated cost at end of year											
	1	2	3	4	5	6	7	8	9	10	11	12
25	5	13	22	34	46	61	76	93	112	131	153	175
50	12	32	55	83	114	149	188	229	275	323	376	431
75	21	54	94	141	194	253	318	389	465	548	636	730
100	31	78	136	204	281	367	462	565	676	796	925	1062
125	41	104	182	273	376	491	617	755	904	1064	1236	1419
150	52	132	231	346	477	622	782	957	1146	1349	*	*
175	63	161	282	423	583	760	957	1169	1400	*	*	*
200	75	192	336	503	693	905	1137	1391	*	*	*	*
225	88	224	391	536	808	1054	1326	*	*	*	*	*
250	101	256	448	672	926	1209	*	*	*	*	*	*
275	114	290	508	761	1049	1369	*	*	*	*	*	*
300	128	325	568	852	1174	*	*	*	*	*	*	*
350	156	397	694	1041	1435	*	*	*	*	*	*	*
400	186	472	826	1239	*	*	*	*	*	*	*	*
450	216	550	963	1444	*	*	*	*	*	*	*	*
500	248	631	1104	*	*	*	*	*	*	*	*	*

INFORMATION SHEET

3. CULTIVATORS

Accumulated Repair Costs per $1,000 or Initial List Price

Hours of annual use	Accumulated cost at end of year											
	1	2	3	4	5	6	7	8	9	10	11	12
25	0	1	3	5	8	11	16	20	26	32	39	47
50	1	5	10	18	28	40	54	71	90	111	135	162
75	3	10	22	37	58	82	112	146	186	231	281	337
100	5	17	36	63	97	138	188	246	312	387	472	566
125	7	25	54	94	145	207	281	367	466	579	705	845
150	10	35	75	130	201	287	390	510	648	804	979	1174
175	13	46	99	172	265	379	515	673	855	1061	1292	1549
200	16	59	126	219	337	482	655	856	1087	1349	*	*
225	20	73	156	271	417	596	809	1058	1344	*	*	*
250	24	88	189	327	504	720	978	1279	*	*	*	*
275	29	105	224	388	598	855	1161	1518	*	*	*	*
300	34	122	262	454	700	1000	1358	*	*	*	*	*
350	45	162	346	599	923	1320	*	*	*	*	*	*
400	57	205	440	762	1174	*	*	*	*	*	*	*
450	71	254	544	942	1541	*	*	*	*	*	*	*
500	85	307	658	1139	*	*	*	*	*	*	*	*

4. DISCS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year											
	1	2	3	4	5	6	7	8	9	10	11	12
25	0	1	2	3	5	7	10	13	17	21	25	30
50	1	3	7	12	18	26	35	46	58	72	88	106
75	2	7	14	24	37	54	73	95	121	150	183	219
100	3	11	24	41	63	90	122	160	203	252	307	368
125	5	16	35	61	94	134	183	239	303	376	458	550
150	6	23	49	85	131	187	254	331	421	522	636	763
175	8	30	65	112	172	246	335	437	556	690	840	1007
200	11	38	82	142	219	313	426	556	707	877	*	*
225	13	47	102	176	271	387	526	688	873	*	*	*
250	16	57	123	213	327	468	636	831	*	*	*	*
275	19	68	146	252	389	556	755	987	*	*	*	*
300	22	80	171	295	455	650	883	*	*	*	*	*
350	29	105	225	390	600	858	*	*	*	*	*	*
400	37	134	286	496	763	*	*	*	*	*	*	*
450	46	165	354	613	943	*	*	*	*	*	*	*
500	55	100	428	740	*	*	*	*	*	*	*	*

INFORMATION SHEET

5.

FORAGE HARVESTERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
25	6	15	25	38	51	66	82	100	118	138	159	180
50	14	36	63	93	126	163	203	245	291	339	390	444
75	24	61	106	157	214	276	343	416	493	575	661	753
100	35	89	154	228	311	401	499	604.	716	835	961	1094
125	47	119	206	305	415	536	667	807	957	1116	1285	1462
150	60	151	261	387	526	679	845	1023	1213	1415	*	*
175	73	185	319	472	643	830	1033	1250	1482	*	*	*
200	87	220	379	562	765	988	1228	1487	*	*	*	*
225	102	256	442	655	892	1151	1432	*	*	*	*	*
250	117	293	507	751	1023	1320	*	*	*	*	*	*
275	132	332	574	850	1157	1494	*	*	*	*	*	*
300	148	372	643	952	1296	*	*	*	*	*	*	*
350	181	454	785	1163	1584	*	*	*	*	*	*	*
400	215	541	934	1384	*	*	*	*	*	*	*	*
450	251	630	1088	1612	*	*	*	*	*	*	*	*
500	287	723	1248	*	*	*	*	*	*	*	*	*

6.

BALERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
25	3	7	12	18	25	32	40	49	58	67	77	88
50	7	18	30	45	61	79	99	120	142	165	190	217
75	12	30	52	77	104	134	167	202	240	280	322	367
100	17	43	75	111	151	195	243	294	349	407	468	533
125	23	58	100	149	202	261	325	393	466	544	626	713
150	29	74	127	188	257	331	412	499	591	690	794	903
175	36	90	155	230	313	405	403	609	722	843	970	1104
200	43	107	185	274	373	481	599	725	859	1002	*	*
225	50	125	215	319	435	561	698	845	1001	*	*	*
250	57	143	247	366	498	643	800	969	*	*	*	*
275	64	162	280	414	564	728	906	1096	*	*	*	*
300	72	181	313	464	632	815	1014	*	*	*	*	*
350	88	221	383	567	772	996	*	*	*	*	*	*
400	105	263	455	674	918	*	*	*	*	*	*	*
450	122	307	530	786	1070	*	*	*	*	*	*	*
500	140	352	608	901	*	*	*	*	*	*	*	*

INFORMATION SHEET

7.

MOWERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
25	15	39	69	103	142	185	232	284	340	400	465	534
50	38	96	169	253	349	455	572	700	838	986	1145	1315
75	64	163	286	429	591	771	969	1185	1419	1671	1940	2227
100	93	238	415	623	858	1120	1408	1723	2062	2428	*	*
125	125	317	555	833	1147	1497	1882	2302	*	*	*	*
150	158	402	704	1055	1454	1898	2386	*	*	*	*	*
175	193	494	860	1290	1777	2319	*	*	*	*	*	*
200	230	585	1023	1534	2113	*	*	*	*	*	*	*
225	268	682	1192	1788	2463	*	*	*	*	*	*	*
250	307	782	1367	2050	*	*	*	*	*	*	*	*
275	348	885	1548	2321	*	*	*	*	*	*	*	*
300	389	991	1733	2599	*	*	*	*	*	*	*	*
350	476	1210	2118	*	*	*	*	*	*	*	*	*
400	566	1440	2519	*	*	*	*	*	*	*	*	*
450	659	1678	*	*	*	*	*	*	*	*	*	*
500	756	1925	*	*	*	*	*	*	*	*	*	*

8.

PLOWS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
25	7	18	31	46	64	83	105	128	154	181	210	241
50	17	44	76	114	157	205	258	316	378	446	517	593
75	29	74	129	193	266	348	437	535	640	754	875	1005
100	42	107	187	281	387	506	636	777	931	1096	1272	1461
125	56	143	251	376	518	676	849	1039	1244	1464	1701	1952
150	71	182	318	476	656	856	1077	1317	1577	1856	2155	2475
175	87	222	388	582	802	1046	1316	1609	1926	2268	2634	3024
200	104	264	462	692	954	1245	1565	1914	2292	2698	*	*
225	121	308	538	807	1111	1451	1824	2231	2671	*	*	*
250	139	353	617	925	1275	1664	2092	2558	*	*	*	*
275	157	399	698	1047	1443	1883	2368	2896	*	*	*	*
300	176	447	782	1173	1616	2109	2651	*	*	*	*	*
350	215	546	956	1433	1974	2577	*	*	*	*	*	*
400	255	650	1137	1705	2343	*	*	*	*	*	*	*
450	297	757	1325	1987	2737	*	*	*	*	*	*	*
500	341	868	1519	2278	*	*	*	*	*	*	*	*

INFORMATION SHEET

9.

PLANTERS - DRILLS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year											
	1	2	3	4	5	6	7	8	9	10	11	12
25	1	3	7	12	18	26	35	46	58	72	88	106
50	3	11	24	71	63	90	122	160	203	252	307	368
75	6	23	49	85	131	187	254	331	421	522	636	763
100	11	38	82	142	219	313	426	556	707	877	*	*
125	16	57	123	213	327	468	363	831	*	*	*	*
150	22	80	171	295	455	650	883	*	*	*	*	*
175	29	105	225	390	600	858	*	*	*	*	*	*
200	37	134	286	496	763	*	*	*	*	*	*	*
225	46	165	354	613	943	*	*	*	*	*	*	*
250	55	200	428	740	*	*	*	*	*	*	*	*
275	66	237	508	879	*	*	*	*	*	*	*	*
300	77	277	594	1028	*	*	*	*	*	*	*	*
350	102	366	784	*	*	*	*	*	*	*	*	*
400	129	465	996	*	*	*	*	*	*	*	*	*
450	160	575	*	*	*	*	*	*	*	*	*	*
500	193	695	*	*	*	*	*	*	*	*	*	*

10.

CORN PICKERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	1	2	3	4	5	6	7	8	9	10	11	12
25	1	2	4	7	10	14	18	23	28	34	40	47
50	2	7	13	21	31	42	55	70	86	103	122	143
75	4	13	25	41	59	81	106	133	164	198	234	274
100	7	20	40	64	94	128	167	211	260	313	371	434
125	9	29	57	92	134	183	239	302	371	447	530	620
150	13	39	76	123	180	245	320	404	497	599	*	*
175	16	50	97	158	230	314	410	517	636	*	*	*
200	20	62	121	195	285	389	507	640	*	*	*	*
225	24	75	146	236	344	469	612	*	*	*	*	*
250	28	88	172	279	407	556	*	*	*	*	*	*
275	33	103	201	325	474	647	*	*	*	*	*	*
300	38	118	231	374	545	*	*	*	*	*	*	*
350	49	151	295	478	697	*	*	*	*	*	*	*
400	60	187	366	592	*	*	*	*	*	*	*	*
450	73	226	442	715	*	*	*	*	*	*	*	*
500	86	267	523	*	*	*	*	*	*	*	*	*

INFORMATION SHEET

11.

CRAWLERS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
500	3	10	19	31	45	61	80	100	124	149	177	207
600	4	13	25	41	60	82	107	135	165	199	236	277
700	5	17	32	53	77	105	136	172	212	255	303	354
800	7	21	40	65	95	129	169	213	262	316	375	438
900	8	25	49	79	115	156	204	257	317	382	452	529
1000	9	29	57	93	136	185	241	305	375	452	536	626
1100	11	34	67	108	158	216	281	355	436	526	624	730
1200	13	39	77	124	181	248	323	408	502	605	717	839
1300	14	45	87	141	206	282	367	464	570	687	815	953
1400	16	50	98	159	232	317	414	522	642	774	917	1073
1500	18	56	110	178	259	354	462	583	717	864	1024	*
1600	20	62	122	197	287	393	512	646	795	958	*	*
1700	22	69	134	217	317	433	564	712	876	1056	*	*
1800	24	75	147	238	347	474	618	780	960	*	*	*
1900	26	82	160	260	378	517	674	851	1046	*	*	*
2000	29	89	174	282	411	561	732	923	*	*	*	*

12.

WHEEL TRACTORS

Accumulated Repair Costs per $1,000 of Initial List Price

Hours of annual use	Accumulated cost at end of year 1	2	3	4	5	6	7	8	9	10	11	12
200	2	5	10	17	25	33	44	55	68	82	97	113
250	2	8	15	24	35	48	62	79	97	117	139	162
300	3	10	20	32	47	64	84	105	130	156	185	217
350	4	13	25	41	60	82	107	135	166	200	237	278
400	5	16	32	51	74	102	132	167	206	248	294	344
450	6	19	38	62	90	123	160	202	248	299	355	415
500	7	23	45	73	106	145	189	239	294	354	420	491
550	9	27	52	85	124	169	220	278	342	412	489	572
600	10	31	60	98	142	194	253	320	393	474	562	657
650	11	35	69	111	162	221	288	363	447	539	639	747
700	13	39	77	125	182	249	324	409	503	607	719	841
750	14	44	86	139	203	278	362	457	562	677	803	940
800	16	49	96	155	225	308	402	507	623	751	891	1042
900	19	59	115	187	272	372	485	612	752	907	1075	1258
1000	23	70	137	221	322	440	574	724	891	1073	1273	1489
1200	30	94	183	296	431	589	768	969	1192	1437	*	*

INFORMATION SHEET

VI. Rule for determining labor cost per acre

$$\frac{\text{Cost per hour}}{\text{Acres per hour}} = \text{Cost per acre}$$

Example: $$\frac{\text{\$2.00 per hour}}{\text{4 acres per hour}} = \text{\$.50 labor cost per acre}$$

VII. Custom work rates for tillage, planting, and miscellaneous jobs

(Work rates are listed on the following pages.)

TABLE I

CUSTOM WORK RATE FOR TILLAGE, PLANTING, AND MISCELLANEOUS JOBS
(Kansas Extension Bulletin MF-253 & MF-254)

		Northwest				West Central				South West			
Operation	Units	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High
Moldblade	acre	7	3.43	2.25	4.00	5	3.65	2.50	4.00	5	3.95	3.25	4.50
Oneway	acre	17	1.65	1.00	3.00	11	1.25	1.00	1.50	8	1.44	1.25	2.00
Discing	acre	16	1.44	1.00	1.75	8	1.34	1.00	1.50	8	1.39	1.00	1.75
Rotary hoeing	acre	8	1.09	.75	1.50	4	.88	.75	1.00	4	.99	.80	1.25
Spike tooth harrow	acre	6	1.14	1.00	1.50	2	1.00	1.00	1.00	7	1.16	.90	1.50
Spring tooth	acre	9	1.25	.75	1.50	3	1.08	1.00	1.25	8	1.19	.75	1.50
Deep chisel	acre	11	1.70	1.25	2.50	3	2.00	1.50	2.50	5	1.80	1.25	2.00
Noble blade	acre	16	1.52	1.00	2.25	8	1.59	1.00	2.50	5	1.35	1.00	1.50
Duckfoot (shallow)	acre	7	1.39	.75	1.75	4	1.44	1.25	1.50	3	1.42	1.25	1.75
Planting sorghum (Row planter with fertilizer attachment)	acre	7	2.75	2.00	3.50	7	2.75	2.00	3.50	7	2.75	2.00	3.50
Row Planter without fertilizer attachment	acre	13	1.81	1.00	3.00	13	1.81	1.00	3.00	16	1.81	1.00	3.00
Drill with fertilizer attachment	acre	6	1.98	1.50	2.50	6	1.98	1.50	2.50	6	1.08	1.50	2.50
Drill without fertilizer attachment	acre	11	1.39	1.00	2.00	11	1.89	1.00	2.00	11	1.39	1.00	2.00
Planting corn with fertilizer attachment	acre	7	2.82	1.50	3.50	7	2.82	1.50	3.50	7	2.82	1.50	3.50
Planting corn without fertilizer attachment	acre	8	2.63	2.00	4.00	8	2.63	2.00	4.00	8	2.63	2.00	4.00
Planting soybeans with fertilizer attachment	acre	12	2.27	1.25	3.50	Use these for Western 2/3 of Kansas				Use these for Western 2/3 of Kansas			
Planting soybeans without fertilizer attachment	acre	11	1.98	1.00	3.00	Use these for Western 2/3 of Kansas				Use these for Western 2/3 of Kansas			
Drilling small grains with fertilizer attachment	acre					4	1.75	1.00	2.50				

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TABLE I (continued)

Operation	Units	North Central No. Repo.	Ave.	Low	High	Central No. Repo.	Ave.	Low	High	South Central No. Repo.	Ave.	Low	High
Moldblade	acre	15	3.87	2.50	4.75	81	3.61	2.00	5.50	35	3.48	2.50	5.00
Oneway	acre	8	2.94	2.00	4.00	21	1.95	1.25	3.50	28	1.79	1.25	8.00
Discing	acre	14	2.07	1.25	3.00	22	1.53	.75	2.50	35	1.57	1.00	8.00
Rotary hoeing	acre	6	1.54	1.00	2.00	10	84	.50	1.50	16	1.00	.60	2.00
Spike tooth harrow	acre	4	1.88	1.00	2.00	11	.91	.50	1.50	22	1.13	.60	2.50
Spring tooth	acre	8	1.50	1.00	2.00	17	1.21	.50	2.00	20	1.35	1.00	2.50
Deep chisel	acre	7	2.57	1.75	3.50	9	2.86	1.75	5.00	22	2.19	1.00	4.00
Noble blade	acre	6	2.58	1.75	4.00	10	2.20	1.00	4.00	22	2.03	1.25	4.00
Duckfoot (shallow)	acre	3	2.58	2.25	3.00	7	1.75	1.00	2.50	16	1.63	1.25	2.50
Planting sorghum (Row planter with fertilizer attachment.)	acre	7	3.00	2.00	4.50	12	2.33	1.50	3.50	10	1.93	1.00	3.00
Row Planter (Without fertilizer attachment)	acre	5	2.60	2.50	3.00	10	1.98	1.25	3.00	13	1.69	1.25	2.75
Drill with fertilizer attachment	acre	4	2.83	1.50	2.50	8	1.84	1.00	2.50	7	1.71	1.25	2.50
Drill without fertilizer attachment	acre	4	1.63	1.00	2.00	9	1.69	1.00	2.50	11	1.29	1.00	2.00
Planting corn with fertilizer attachment	acre	21	2.27	1.00	3.50	21	2.27	1.00	3.50	21	2.27	1.00	3.50
Planting corn without fertilizer attachment	acre	14	1.96	1.25	3.00	14	1.96	1.25	3.00	14	1.96	1.25	3.00
Planting soybeans with fertilizer attachment	acre	Use North West figures for Western 2/3 of Kans.				Use North West figures for Western 2/3 of Kans.				Use North West figures for Western 2/3 of Kans.			
Planting soybeans without fertilizer attachment	acre	Use North West figures for Western 2/3 of Kans.				Use North West figures for Western 2/3 of Kans.				Use North West figures for Western 2/3 of Kans.			
Drilling small grains with fertilizer attachment	acre	8	2.31	1.50	3.00	13	1.67	1.00	2.75	15	1.45	.75	2.00

TABLE I (continued)

Operation	Units	North East No. Repo.	North East Ave.	North East Low	North East High	East Central No. Repo.	East Central Ave.	East Central Low	East Central High	South East No. Repo.	South East Ave.	South East Low	South East High
Moldblade	acre	36	4.99	3.50	6.00	23	4.40	2.50	6.00	34	4.37	3.00	6.00
Oneway	acre	10	3.55	1.50	5.00	7	2.61	1.25	3.50	12	2.98	1.75	4.00
Discing	acre	27	2.09	1.25	3.00	21	1.76	1.00	3.00	32	1.80	1.00	3.50
Rotary hoeing	acre	8	1.00	.50	2.00	7	1.07	1.00	1.50	11	1.14	.75	1.50
Spike tooth harrow	acre	17	1.22	.50	2.50	14	1.14	.75	2.00	28	1.04	.50	2.00
Spring tooth	acre	13	1.52	1.00	2.00	6	1.21	1.00	1.50	21	1.35	.75	2.00
Deep chisel	acre	10	4.50	3.00	5.50	8	4.22	3.00	6.00	17	3.26	1.50	5.00
Noble blade	acre	3	1.92	1.25	3.00	3	1.92	1.25	3.00	3	1.92	1.25	3.00
Duckfoot (shallow)	acre	5	1.57	1.00	2.00	5	1.57	1.00	2.00	5	1.57	1.00	2.00
Planting sorghum (Row planter with fertilizer attachment	acre	26	2.54	1.25	4.00	15	2.12	1.25	2.50	22	2.03	1.25	2.75
Row Planter (Without fertilizer attachment)	acre	20	2.24	1.50	4.00	12	1.73	1.00	2.50	18	1.67	1.00	2.50
Drill with fertilizer attachment	acre	10	2.38	1.75	4.00	8	1.01	1.25	2.50	15	1.92	1.25	2.75
Drill without fertilizer attachment	acre	10	1.93	1.00	3.00	9	1.72	1.00	2.50	13	1.54	1.00	2.50
Planting corn with fertilizer attachment	acre	23	2.64	1.25	5.00	14	2.16	1.25	2.50	20	1.95	1.25	2.75
Planting corn without fertilizer attachment	acre	20	2.28	1.75	3.00	11	1.89	1.00	3.00	14	1.57	1.00	2.50
Planting soybeans with fertilizer attachment	acre	20	2.57	1.25	4.00	12	2.21	1.50	2.50	20	2.05	1.25	3.00
Planting soybeans without fertilizer attachment	acre	17	2.28	1.50	3.00	9	1.86	1.25	2.50	15	1.70	1.00	2.50
Drilling small grains with fertilizer attachment	acre	18	2.08	1.25	3.00	16	1.84	1.25	2.50	31	1.85	1.00	2.75

TABLE I (continued)

		North East				East Central				South East			
Operation	Unit	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High
Drilling small grains without fertilizer	acre	12	1.58	1.00	2.00	13	1.54	1.00	2.50	23	1.46	1.00	2.50
Row crop cultivation with fetilizer	acre					Average for entire state				Average for entire State			
Row crop cultivation without fertilizer	acre					Average for entire state				Average for entire State			
Applications of fertilizer:													
Dry	acre					Average for entire state				Average for entire State			
Liquid	acre												
Anhydrous Ammonia	acre												
Combine harvest:													
Wheat	acre	57	5.24	3.50	7.00	40	4.98	3.50	6.00	55	4.85	3.50	6.00
Extra charge for yield	bushel	9	.05			5	.048			11	.049		
Sorghum	acre	54	5.54	3.50	7.00	34	5.31	3.50	7.00	51	4.98	4.00	7.00
Extra charge for high yield	bushel	9	.057			9	.057			13	.05		
Harvesting corn	acre	40	5.25	3.50	7.00	32	5.03	4.00	6.00	30	4.80	4.00	6.50
Extra charge for high yield	bushel	40	.037	.02	.06	32	.044	.03	.05	30	.05	.05	.05
Soybeans	acre	52	5.98	5.00	8.00	30	5.55	9.00	7.00	45	5.33	4.00	7.00

TABLE I (continued)

		North Central				Central				South Central			
Operation	Unit	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High
Drilling small grains without fertilizer	acre	7	1.89	1.00	2.50	13	1.60	1.00	2.50	30	1.30	.50	3.00
Row crop cultivation with fertilizer	acre					30	1.99	.75	3.00				
Row crop culitivation without fertilizer	acre					67	1.67	1.00	3.00				
Application of fertilizer:													
Dry	acre					98	.84	.35	2.00				
Liquid	acre					100	.98	.35	2.50				
Anhydrous Ammonia	acre					188	1.77	.50	3.00				
Combine harvest:													
Wheat	acre	37	3.82	3.00	5.00	85	3.76	3.50	4.50	90	3.58	3.00	5.00
Extra charge for yield	bushel	33	.05			79	.05			82	.05		
Sorghum	acre	32	3.93	3.50	5.00	50	3.45	3.50	5.00	50	3.64	3.00	5.00
Extra charge for high yield	bushel	27	.05			43	.052			37	.049		
Harvesting corn	acre	9	6.00	4.00	10.00	7	6.21	3.50	10.00	3	4.75	4.25	5.00
Extra charge for high yield	bushel	9	.05	.05	.05	7	.05			3	.045	.04	.05
Soybeans	acre	31	4.65	3.50	6.00	Western 2/3 of Kans.				Western 2/3 of Kans.			

TABLE I (continued)

Operation	Units	Northwest				West Central				South West			
		No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High	No. Repo.	Ave.	Low	High
Drilling small grains without fertilizer	acre	16	1.40	1.00	2.00	6	1.38	1.00	2.00	6	1.38	1.00	2.00
Row crop cultivation with fertilizer	acre	Average for entire state				Average for entire state				Average for entire state			
Row crop cultivation without fertilizer	acre	Average for entire state				Average for entire state				Average for entire state			
Application of fertilizer:													
Dry	acre	Average for entire state				Average for entire state				Average for entire state			
Liquid	acre	" " " "				" " " "				" " " "			
Anhydrous Ammonia	acre	" " " "				" " " "				" " " "			
Combine harvest:													
Wheat	acre	37	3.51	3.00	4.00	36	3.48	2.50	4.00	37	3.82	3.00	5.00
Extra charge for yield	bushel	36	.05			36	.051			26	.05		
Sorghum	acre	24	3.60	3.50	5.00	18	3.44	3.00	4.00	14	3.46	2.50	4.00
Extra charge for high yield	bushel	21	.049			16	.05			11	.05		
Harvesting corn	acre	5	6.80	4.00	10.00	5	6.80	4.00	10.00	5	6.80	4.00	10.00
Extra charge for high yield	bushel												
Soybeans	acre	Western 2/3 of Kansas				Western 2/3 of Kansas				Western 2/3 of Kansas			

INFORMATION SHEET

Example: The average custom rate for moldboard plowing in panhandle is $3.21 per acre.

VIII. Determining which is cheapest--ownership or custom operator

Example: You have 125 acres of alfalfa hay which you will be cutting four times annually. You have been paying $3.00 per acre to have a custom operator swath your hay. You can purchase a new fourteen foot self-propelled swather for $5,850. The list price is $6,500. Gasoline costs 20¢ per gallon and you pay $2.00 per hour for labor. You estimate that you can swath five acres per hour. If you purchase the swather you would keep it eight years. Is it cheaper to own the swather or hire the custom operator?

Step A Determine acres of annual use

1. 4 cuttings x 125 acres = 500 acres annual use

2. $\frac{\text{500 acres annual use}}{\text{5 acres per hour}} = \text{100 hours annual use}$

Step B Calculate ownership

1. Initial list price x factor (Refer to table in III of information sheet.) = annual ownership cost

2. \$4,500 x 12.3% = \$799.50 annual ownership cost

3. $\frac{\text{\$799.50 annual ownership cost}}{\text{500 acres of annual use}} = \text{\$1.60 ownership cost/acre}$

Step C Calculate fuel cost per acre

1. $\frac{\text{Initial list price}}{\text{1,000}} \times \text{fuel price} \times \text{fuel factor} = \text{fuel cost per hour}$

(NOTE: Refer to table in IV of information sheet.)

2. $\frac{6500}{1000} \times \$.20 \times .79 = \$1.03 = \text{fuel cost per hour}$

3. $\frac{\text{\$1.03 fuel cost per hour}}{\text{5 acres per hour}} = \$.21 = \text{Fuel cost per acre}$

INFORMATION SHEET

Step D Calculate repair cost

1. $$\frac{\text{Initial list price}}{\$1000} \times \begin{array}{l}\text{accumulated repair}\\ \text{cost per \$1000 of}\\ \text{initial list price}\end{array} = \begin{array}{l}\text{Total}\\ \text{accumulated}\\ \text{repair cost}\end{array}$$

   (NOTE: Refer to swather table in V-B-2 of information sheet.)

2. $6500 \times \$565 = 3{,}672.50 =$ Total accumulated repair cost

3. $$\frac{\$3{,}672.50}{\text{8 years}} = 459.06 \text{ annual repair cost}$$

4. $$\frac{\text{459.06 annual repair cost}}{\text{500 acres annually}} = \begin{array}{l}\text{\$.92 per acre}\\ \text{repair costs}\end{array}$$

Step E Calculate labor cost per acre

1. $$\frac{\text{Labor cost per hour}}{\text{Acres per hour}} = \text{labor cost per acre}$$

2. $$\frac{\$2.00}{5} = \$.40 \text{ labor cost/acre}$$

Step F Calculate variable cost per acre

1. Fuel $.21
2. Repairs $.92
3. Labor $.40

   $1.53 variable cost per acre

Step G Calculate total cost per acre

1. Ownership cost $1.40

   $1.53

2. Variable cost $2.93 total cost per acre

Step H Determine which is cheapest

1. Custom cost per acre as given in example = $3.00
2. Ownership cost per acre as determined = $2.93
3. Operator would save 7¢ per acre by owning the swather

INFORMATION SHEET

IX. Calculating break-even acreage

$$\frac{\text{Annual ownership cost}}{\text{Custom rate-variable cost}} = \begin{array}{l}\text{Acres needed}\\ \text{to break even}\end{array}$$

Example:

$$\frac{\text{\$459 annual ownership cost}}{\begin{array}{l}\text{\$3.00 custom rate--\$1.53}\\ \text{variable cost}\end{array}} = \frac{\$459}{\$1.47} = \begin{array}{l}\text{312.24 acres needed}\\ \text{to break even}\end{array}$$

MACHINERY & EQUIPMENT MANAGEMENT - CUSTOM SERVICE VERSUS OWNERSHIP

UNIT VII

ASSIGNMENT SHEET #1 - DETERMINE CUSTOM WORK RATES

Using the table found in VII of Information Sheet, determine the following custom rates for Kansas.

1. The average custom rate per acre for moldboarding Northeast Kansas.
2. The average rate per acre for application of dry fertilizer in Kansas (entire state all one average.)
3. The average combining rate per acre for combining wheat Southwest Kansas. (not including charge for extra high yield)
4. The average custom charge for spring tooth harrowing in North Central Kansas.
5. The average custom charge for drilling wheat without fertilizer attachment in Northwest Kansas.
6. The average custom rate per acre for planting soybeans with a fertilizer attachment in East Central Kansas.

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

ASSIGNMENT SHEET #2--DETERMINE COST OF CUSTOM HIRING VERSUS OWNERSHIP

1. Determine if it is cheaper to own a machine or hire a custom operator for the following problem.

   You have 200 acres of alfalfa which you will be cutting 4 times annually. You have been paying $3.10 per acre to have a custom operator swath your hay. You can purchase a new 14 foot self-propelled swather for 5,700. The list price is $6,300. Gasoline cost 20¢ per gallon and you pay $2.00 per hour for labor. You estimate that you can swath 4 acres per hour. If you purchase the swather you would keep it 6 years.

   (NOTE: Use the same steps as given in VIII of information sheet.)

ASSIGNMENT SHEET #2

2. Determine the number of acres needed to break even with the present custom rate using the situation stated in question 1 of this assignment sheet.

(NOTE: $\dfrac{\text{Ownership cost}}{\text{Custom rate-variable ccst}} = \text{Acres to equal custom rate}$

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

ASSIGNMENT SHEET #3--DETERMINE BREAK-EVEN POINTS

1. Determine the number of acres needed to break even with the present custom rate using the following example.

The custom rate for combining wheat is $4.0- per acre. You are considering buying a new combine for $9,900.00 that has an initial list price of $11,000.00. This machine will harvest four acres per hour. Gasoline costs 20¢ per gallon and you pay $2.00 per hour for labor. You plan to keep the combine 10 years and use the machine 125 hours per year.

Step A Calculate total ownership cost using table found in III of information sheet. Initial list price x (Table %) = Annual ownership cost

Step B Calculate fuel cost per acre. Refer to fuel factor table on IV of information sheet.

$$\frac{\text{Initial list price}}{1{,}000} \text{ X fuel price X fuel factor} = \text{fuel cost per hour}$$

$$\frac{\text{Fuel cost/hour}}{\text{acres per hour}} = \text{fuel cost per acre}$$

Step C Calculate repair cost. Refer to table found in V of information sheet.

$$\frac{\text{Initial list price}}{1000} \text{ X } \begin{array}{c}\text{Accumulated repair cost}\\ \text{per \$1,000 of initial}\\ \text{list price}\end{array} = \begin{array}{c}\text{Total accumulated}\\ \text{repair cost}\end{array}$$

$$\frac{\text{Total accumulated repair cost}}{\text{Number of years}} = \text{annual repair cost}$$

$$\frac{\text{Annual repair cost}}{\text{Hours used annually}} = \text{Repairs per hour}$$

$$\frac{\text{Repairs per hour}}{\text{Acres per hour}} = \text{Repairs per acre}$$

Step D Calculate labor cost per acre

$$\frac{\text{Cost per hour}}{\text{acres per hour}} = \begin{array}{l}\text{Labor}\\ \text{Cost per acre}\end{array}$$

Step E Calculate variable cost per acre--(Add fuel, repairs, and labor cost per acre.)

ASSIGNMENT SHEET #3

Step F Calcualte break-even acreage

(NOTE: $\frac{\text{Ownership cost}}{\text{Custom rate--Variable cost}}$ = Acres to equal custom rate)

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. $4.99
2. $ .84
3. $3.48
4. $1.50
5. $1.40
6. $1.86

Assignment Sheet #2

1. a. 4 cutting x 200 acres = 800 acres annual use

$\frac{\text{800 acres annual use}}{4}$ = 200 hours annual use

b. 6300 x 10.8% = $680.40 annual ownership cost

$\frac{680.40}{800}$ = .85 ownership cost per acre

c. $\frac{6300}{1000}$ x .20 x .79 = $1.00 fuel cost per hour

$\frac{\$1.00}{\text{4 acres per hour}}$ = $.25 fuel cost per acre

d. $\frac{6300}{1000}$ x $905 = $5701.50 accumulated repair cost

$\frac{5701.50}{\text{4 years}}$ = $1425.37 annual repair cost

$\frac{1425.37}{\text{800 acres annually}}$ = $1.78 per acre repair cost

e. $\frac{\$2.00}{\text{4 acres per hour}}$ = $.50 labor cost per acre

f. Variable cost per acre:
Fuel (.25) repairs ($1.78) labor (.50) = $2.53

g. Ownership cost = $.85 per acre

Variable cost = $\frac{2.53}{3.38}$ per acre

ANSWER: It would cost $.38 per acre to own the machine rather than hire custom operator

2. $$\frac{\text{Ownership cost - 680.40}}{\text{Custom rate - \$3.00 minus variable cost - \$2.53}} = \frac{680.40}{.47} = 14447.6 \text{ acres}$$

4 cuttings per year 1447.6 divided by 4 = 361.9 acres of alfalfa needed to break even with custom rate

Assignment Sheet #3

1. a. $11,000 x 10.7% = $1,177 annual ownership cost

   b. $$\frac{\$11,000}{1,000} \times \$.20 \times .79 = \$1.74 \text{ fuel cost per hour}$$

   c. $$\frac{\$11,000}{1,000} \times \$171 = \$1,881 \text{ total accumulated repair cost}$$

   $$\frac{\text{1,881 total accumulated repair cost}}{\text{10 years}} = \$188.10 \text{ annual repair cost}$$

   $$\frac{\text{\$188.10 annual repair cost}}{\text{125 hours annually}} = \$1.50 \text{ repairs per hour}$$

   $$\frac{\text{\$1.50 repairs per hour}}{\text{4 acres per hour}} = \$.37 \text{ repairs per acre}$$

   d. $$\frac{\text{\$2.00 per hour}}{\text{4 acres per hour}} = \$.50 \text{ per acre}$$

   e. Variable cost--Fuel (.43), repairs (.37), labor (.50) equals $1.30 variable cost per acre

   f. $$\frac{\text{Ownership cost}}{\text{Custom rate- variable to equal custom rate}} = \underline{\$1,177} = \frac{\$1,177}{\begin{array}{c}\$4.00\\ \$1,30\end{array}} = \overset{\text{436 acres}}{\$2.70}$$

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

TEST

1. Match the terms on the right to the proper definition.

_____a. Operating costs which include repair bills, maintenance, gas, oil and/or lubrication, and general upkeep

_____b. Includes depreciation, taxes, insurance, and interest on investments

2. Select from the list below the advantages and disadvantages of custom service. Place an "X" by correct answers.

Advantages:

_____a. Ownership costs are eliminated

_____b. It is nearly always cheaper to hire custom operators than to own machinery

_____c. There may be benefits from newer machinery, a skilled operator, and less time required

Disadvantages:

_____d. Service may not be available when the job is ready

_____e. Capital can be invested in other enterprises

3. If the annual fixed cost was 19.8% of the initial list price, what would the annual ownership cost for a $9,000 combine be?

4. Apply the following information in determining fuel cost per acre.

$$\frac{\text{Fuel cost per hour} = \$1.10}{\text{Acres per hour} = 5} = \underline{\hspace{4cm}} \text{ fuel cost per acre}$$

5. Apply the following information in determining per acre repair cost.

$$\frac{\$1500 \text{ annual repair cost}}{800 \text{ acres}} = \underline{\hspace{4cm}} \text{ per acre repair cost}$$

6. Apply the following information in determining the labor cost per acre.

$$\frac{\$1.75 \text{ labor cost per hour}}{5 \text{ acres per hour}} = \underline{\hspace{6em}} \text{labor cost per acre}$$

7. Determine custom rates when given a chart.

8. Determine if it is cheaper to own a machine or hire the custom operator.

9. Determine the number of acres a machine must be used to break even with the custom rate.

(NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities (7,8, and 9) should be completed.)

MACHINERY AND EQUIPMENT MANAGEMENT--CUSTOM SERVICE VERSUS OWNERSHIP
UNIT VII

ANSWERS TO TEST

1. a. 2

   b. 1

2. a

   c

   d

3. 9000 x 19.8% = $1782.00

4. $\frac{1.10}{5}$ = $.22

5. $\frac{1500}{800}$ = $1.87

6. $\frac{1.75}{5}$ = $.35

7. Evaluated to the satisfaction of the instructor.

8. Evaluated to the satisfaction of the instructor.

9. Evaluated to the satisfaction of the instructor.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

TERMINAL OBJECTIVES

After completion of Unit VIII, the student should be able to name reasons for using enterprise analysis. He should be able to calculate unit cost analysis and evaluate each enterprise he owns. He should be able to identify strong and weak points of each enterprise and compare them to his fellow classmates . This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Name four reasons for using enterprise analysis.
2. Calculate unit cost analysis for each enterprise owned.
3. Identify strong and weak points of each enterprise and compare to fellow classmates.
4. Demonstrate the ability to analyze each enterprise owned by completing the assignment sheets.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test

Students:

1. Read objectives
2. Study information sheets
3. Complete each assignment sheet that pertains to your enterprise
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Assignment sheets
    - #1--Breeding Enterprise Analysis
    - #2--Feeding Enterprise Analysis
    - #3--Crop Enterprise Analysis
    - #4--Dairy Enterprise Analysis
4. Test
5. Answers to test

References:

1. Future Farmers of America, Supervised Training Record Book. Vocational Agriculture, State Department of Vocational and Technical Education, Stillwater, Oklahoma

2. Texas Agricultural Education Instructional Materials. Texas Agricultural Education Teaching Materials Center, College Station, Texas.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

INFORMATION SHEET

I. Reasons for using enterprise analysis

A. Aids in planning future farm and ranch operations

B. Allows comparison of one enterprise to another

C. Identifies management decisions

D. Evaluates efficiency as manager

II. Unit cost analysis

A. Breeding enterprise

1. Number of breeding animals

2. Percent of calf crop

3. Percent of lamb crop

4. Number of pigs weaned per litter

5. Weight of calves at weaning

6. Weight of pigs at 35 days

B. Feeding enterprise

1. Number of animals on feed

2. Starting weight of animals

3. Final weight of animals

4. Number of days on feed

5. Total gain in pounds

a. Subtract starting weight from final weight

b. Example

Final weight of barrow	215 pounds
Starting weight of barrow	40 pounds
Total gain in pounds	175

INFORMATION SHEET

6. Pounds gained per day

    a. Divide gain per animal in pounds by number of days on feed

    b. Example

    Total gain of barrow 175 pounds
    Number of days on feed 90 days
    175 divided by 90 = 1.94 pounds gained per day

7. Pounds of feed fed

8. Pounds of feed required per pound of gain

C. Crop enterprise

1. Number of acres in enterprise

2. Amount of seed used per acre

3. Fertilizer used

    a. Kind

    b. Pounds per acre

    c. Cost per acre

4. Yield per acre

    a. Total production divided by number of acres

    b. Example

    Produced 16,000 bushels
    Number of acres 400
    16,000 bushels divided by 400 acres = 40 bu. per acre

5. Cost per bushel, pounds, tons

    a. Total expenses divided by total production

    b. Example

    Produced 16,000 bushels
    Total expense
    16,000 bushels = total expense

INFORMATION SHEET

D. Dairy enterprise

  1. Number of cows in production
  2. Average production per cow
  3. Average butterfat production per cow
  4. Average butterfat percent for herd
  5. Feed cost per pound of butterfat produced

III. Strong and weak points

A. Strong

  1. Breeding
    a. 90% calf crop
    b. 125% lamb crop
    c. 8.5 pigs weaned per litter
    d. Weighing
    e. Facilities
  2. Feeding
    a. Efficiency
    b. Weighing
    c. Parasite and disease control
    d. Facilities
    e. Water supply
  3. Crops
    a. Quality
    b. Fertilizer
    c. Weed control
    d. Yield
    e. Seedbed preparation

INFORMATION SHEET

4. Dairy
    a. Testing and records
    b. Water supply
    c. Sanitation
    d. Yield
    e. Parasite and disease control

B. Weak
    1. Breeding
        a. Less than 90% calf crop
        b. Less than 125% lamb crop
        c. Weaning less than eight pigs per litter
        d. Poor facilities
    2. Feeding
        a. Poor feed conversion
        b. Poor feeding facilities
        c. Failure to provide adequate water supply
        d. Failure to feed a balanced ration
        e. Poor parasite and disease control
    3. Crop
        a. Failure to plant high quality seed
        b. Failure to fertilize
        c. Poor weed control management
        d. Yield too low
        e. Poor seedbed preparation

INFORMATION SHEET

4. Dairy

   a. Poor records

   b. Failure to test production

   c. Poor sanitation

   d. Poor parasite and disease control

   (NOTE: The teacher may wish to give the students the standards of the local community or the county. We suggest that students with the same enterprise compare and evaluate each other's records.)

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

ASSIGNMENT SHEET #1--BREEDING ENTERPRISE ANALYSIS

Circle Enterprise
Beef, Sheep, Swine

School Year____________

Breed___________

Date Started_______________

Date Closed_______________

		State Standards	Local Standards	Goals
Number of breeding animals				
Percent of calf crop				
Percent of lamb crop				
Number of pigs weaned per litter				
Weight of calves at weaning				
Weight of pigs at 35 days				
Cost per pound of gain				

Strong Points	Weak points
1.	1.
2.	2.
3.	3.

Suggestions for Improving Weak Points

1.

2.

3.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM

UNIT VIII

ASSIGNMENT SHEET #2--FEEDING ENTERPRISE ANALYSIS

Circle Enterprise
Beef, Sheep, Swine

School Year ____________

Breed ____________

Date Started ____________

Date Closed ____________

		State Standards	Local Standards	Goals	
Number of animals on feed					
Starting weight of animals					
Final weight of animals					
Number of days on feed					(Swine)
					(Sheep)
					(Beef)
Total gain in pounds					
Total gain per day					(Swine)
					(Sheep)
					(Beef)
Pounds of feed fed					
Pounds of feed required per pound of gain					(Swine)
					(Sheep)
					(Beef)
Cost per unit					

Strong Points

1.

2.

3.

Weak Points

1.

2.

3.

ASSIGNMENT SHEET #2

Suggestions for Improving Weak Points

1.

2.

3.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

ASSIGNMENT SHEET #3--CROP ENTERPRISE ANALYSIS

Type of Crop__________ Current School Year_______

Date Started__________ Date Closed__________

		Local Standards	Goals
Number of acres in enterprise			
Amount of seed used per acre			
Cost of seed per acre			
Fertilizer used			
Kind:			
Pounds per acre:			
Cost per acre:			
Chemicals used			
Kind:			
Pounds per acre:			
Cost per acre:			
Tillage cost per acre			
Other costs			
Yield per acre			
Cost per bushel, pounds, tons			

Strong Points	Weak Points
1.	1.
2.	2.
3.	3.

ASSIGNMENT SHEET #3

Suggestions for Improving Weak Points

1.

2.

3.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

ASSIGNMENT SHEET #4--DAIRY ENTERPRISE ANALYSIS

Breed__________ Current School Year__________

Date Started__________ Date Closed__________

		State Standards	Local Standards	Goals
Number of cows in production	______	______	______	______
Average production per cow	______	______	______	______
Average butterfat production per cow	______	______	______	______
Average butterfat percent for herd	______	______	______	______
Feed cost per pound of butterfat produced	______	______	______	______

Strong Points	Weak Points
1.	1.
2.	2.
3.	3.

Suggestions for Improving Weak Points

1.

2.

3.

ANALYSIS AND EVALUATION OF SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

TEST

1. Name four reasons for using enterprise analysis

   a.

   b.

   c.

   d.

2. Calculate the following problems:

   a. Fred the chapter farmer has a dairy herd of 22 Holstein-Friesian cows that produce 4,400# of milk in one week. The state average per cow is 10,500# of milk per cow per year. Fred's goal is to better the state average by 3%. The cows can be expected to produce at this rate for 10 months.

      1) Did Fred's cows beat the state average?

      2) How many pounds of milk per production day per cow was Fred's goal?

   b. Ernie Mader has 65 acres of wheat which he has an agreement with the landlord where Ernie gets 2/3 of the total income. If the wheat yields 42 bushels/acre and sells for $2.86/bushel, how much would Ernie pay his landlord?

   c. Bill Able has 10 steers which when put on full feed will eat 20# of feed/day/head. If feed costs $105.00/ton and he feeds them for 155 days with an ADG of 2.5# what will his feed costs be per pound of gain?

3. Identify strong and weak points of each enterprise and compare to fellow classmates!

4. Demonstrate the ability to analyze each enterprise owned by completing the assignment sheets.

ANALYSIS AND EVALUATION
SUPERVISED FARM TRAINING PROGRAM
UNIT VIII

ANSWERS TO TEST

1. a. Aids in planning future farm and ranch operations

   b. Allows comparison of one enterprise to another

   c. Identifies management decisions

   d. Evaluates efficiency as manager

2. a. 1) No

   2) 26.8#/head/production day

   b. $2,602.60

   c. $.42

3. and 4. Performance skills will be evaluated by the instructor.

FARM RECORDS--RECORD BOOK CLOSING
UNIT IX

TERMINAL OBJECTIVES

After completion of Unit IX, the student should be able to demonstrate his ability to complete his Kansas Vocational Agriculture Record Book and open a new Kansas Vocational Agriculture Record Book. This knowledge will be evidenced by completing his record book with all business figures 100 percent accurate. The information pages in the record book will be 90 percent accurate.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. Complete the livestock feed and labor records with total of columns 14 and 15 equaling total of column 16.
2. Complete the totals on the receipt pages and have column A and B equal the total of columns 1-16.
3. Complete the totals on the expense pages and have columns A and B equal the total of columns 1-17.
4. Complete the livestock breeding, production, and mortality records.
5. Figure straight line depreciation and complete the depreciation page.
6. Complete the livestock production records
7. Complete the ending inventories throughout the book
8. Complete the end of year accuracy checks
9. Complete the livestock analysis records
10. Complete the new farm income computed on accrual basis and the cash method.
11. Complete the net worth statement

FARM RECORDS--CLOSING RECORD BOOK
UNIT IX

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheet

Student:

1. Read objectives
2. Study information and assignment sheets
3. Complete assignment sheets
4. Turn in assignment sheet for grade

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Assignment sheet
    - #1 - Cash balance sheet

INFORMATION SHEET
UNIT IX

Enterprise: Farm Management

Lesson: Closing Record Book and Auditing

Please check each letter or number when completed, and circle if the item does not apply to your record book.

1. A. Complete pages 1,2,3,
   B. Bring Dairy up to date
   C. Complete agreement, especially if any changes or additions needed from balancing and completing record book.

2. Livestock, feed, and labor record, pages 36 and 37.
   A. Be certain all feed and labor are recorded for each month
   B. Transfer values to columns 14 and 15
   C. Total value of feed for each month in column 16.
   D. Total all columns and check for accuracy (columns 1-13 = 16 to balance.)

3. Crop operations, pages 39-42.
   A. Make sure all operations are listed
   B. Total all operation columns
   C. Complete crop analysis lines 11-31
   D. If any hired labor, in line 17; list the month or months
   E. Complete crop production record, lines 1-10
   F. Complete crop record practice
   G. Complete supply and disposal (total supply = total disposal).

4. Receipts pages 10-25
   A. Each receipt recorded in A or B and one column that is numbered
   B. Total on all receipts, line 34 (A plus B = total of columns 1-16)
   C. Audit by use of Number 1 on page 3 of this audit.

5. Expenses pages 16-25
   A. Each expense recorded in A or B and one of the numbered columns
   B. Total all expense columns on last page of expenses on line 35
   C. A plus B = total of columns 1-17
   D. Audit by using Number 11 on page 3 of this audit.

6. Complete and total value of "Farm products used at home," page 33

7. Complete "Livestock Breeding and Mortality Record," page 32,33
   Births minus deaths = pigs weaned in total column

8. Complete "Land Record" on page 38.

9. Complete the total "Daily Production Record," page 33 for dairy and poultry

INFORMATION SHEET

10. Complete closing "Inventory of all Livestock, Grain, Feed, Seed, and Supplies," pages 26,27.

11. Turn to page 30 and fill in column 2, End of Year Net Worth Statement

12. Complete "Livestock Production Record," pages 34 to 35, the number of animals in column should equal the number of animals in column 3 on line 27

    A. Cattle   B. Hogs   C. Sheep

13. Total personal expenses into one figure on page 46, circle and label

14. Complete inventory and depreciation, page 26.
    A. Livestock
    B. Machinery and equipment, then turn to page 30, and enter figure in column 2, line 1.

15. A. Complete "Inventory of Farm Receivables," page 27.
    B. Audit the A columns pages 10 and 12 of receipts. If column A is larger than the total amount received on new accounts in column 15, you have some new accounts to enter on page 27, column 14 lines 22,25.
    C. Complete accounts payable on page 31

16. A. Complete "Inventory of Farm Payables," on page 27, line 31-34.
    B. Audit the A columns on expense pages, 11 column A is larger than the total amount paid on new accounts in column 16, you have some new accounts to enter on page 27, column 14.
    C. Complete accounts payable on page 31

17. Complete "Cash Balance," on page 31

18. Complete "Livestock Analysis," page 31

19. Complete "Net farm Income Computed on 'Accrual Basis'." page 28

20. Complete "Schedule of Farm Income and Expenses Computed by the Cash Method," page 29.

21. Complete "Net Worth Statement," and "Progress Report," page 30

22. Complete page 49, "Completed Program for the Year"

23. Complete number 3 "Audit of Cash Balance," on page 3

24. List special conditions, or unusual business items below and hand in record book for approval with this check sheet.

FARM RECORDS--RECORD BOOK CLOSING
UNIT IX

ASSIGNMENT SHEET #1 - CASH BALANCE SHEET

I. Auditing of Receipts, pages 10-13:

- A. Line 34, Column A . . . . ____________
- B. Line 34, Column B . . . . ____________
- C. ____________

	Total Column	Amount
D. Line 34, Columns 1-6		
Receipts		
Total of Columns 1-16 in line 36		

____________Total

II. Audit of Expenses, pages 16-25.

- A. Line 35, Column A . . . . ____________
- B. Line 35, Column B . . . . ____________
- C. ____________

	Total Column	Amount
D. Line 35, Columns (1-17)		

Total of Expenses Columns 1-17, in line 35 ____________Total

III. Audit of Cash Balance:

- A. Cash on hand as of January 1, page 27, Col. 13, L19 . . . ____________
- B. Total cash receipts for the year, page 10-13, Col.B . . . ____________
- C. Total (A + B) cash to account for . . . . ____________
- D. Total farm cash expenses for the year, page 16-25, Col. B, line 35, plus personal expenses, page 44 . . . . ____________
- E. Cash on hand end of year, page 27, Col. 16, line 17 . . ____________
- F. Sum (D + E) . . . . ____________
- G. Does total on C equal total on F? . . . . ____________
  (If not, books are incorrect)
- H. Net Farm Income (Page 28, L 62) + gifts (page 30, L24) minus personal expenses (page 44, complete total) should equal change in Net Worth (page 30, L24) . . . . ____________

(NOTE: Section H may not balance; depends on how gifts are handled in records.)

TRANSFERING RECORDS TO CURRENT ACCOUNT BOOK
UNIT X

TERMINAL OBJECTIVES

After completion of Unit X, the student should be able to transfer all necessary enterprise entries and other information from the past years account book to the current account book. This knowledge will be evidenced by a comparison of the current to the past years account book.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Transfer all information necessary to accurate record keeping from one years record book to the next.
2. Keep neat and accurate records.

TRANSFERING RECORDS TO CURRENT ACCOUNT BOOK
UNIT X

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information sheet
3. Discuss terminal and specific objectives with students
4. Discuss information and assignment sheets with students
5. Allow students to transfer enterprise and other information from past years account book to current account book.

Student:

1. Read objectives
2. Study information sheets
3. Complete the transfer of all necessary information from past to current account book

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets

Additional materials:

1. Kansas Vocational Agriculture Record Book, The Interstate Printers and Publishers, Inc., Danville, Illinois 61832

TRANSFERING RECORDS TO CURRENT ACCOUNT BOOK
UNIT X

INFORMATION SHEET

I. Transfering information from past years to current years account book

A. Page 1
  1. Section A: transfer offices and or committees which are current for the coming year
  2. Section C: transfer activities that are still current
  3. Section D: same

B. Page 2: transfer any projects that are carried over into the coming year

C. Page 4: write a short paragraph about your current supervised experience program

D. Page 7: transfer and update changes from past book--get signatures

E. Page 26
  1. Depreciation schedule: column 10 of past book becomes column 7 of current book, leave other columns as is, if using straight line depreciation
  2. Inventory of Grains and Feeds: column 14,15,16 in past book become 11,12,13, respectively of current book; columns 20,21,22 become 17,18,19 respectively; 26,27,28 become 23,24,25

F. Page 27
  1. Inventory of Livestock: columns 4,5,6 of past book become 1,2,3 respectively of current book; columns 10,11,12 of past book become 7,8,9 respectively of current book
  2. Inventory of Receivables and Payables: column 16 of past book becomes 13 of current book

G. Page 28 Net Farm Income: transfer from indicated pages lines 3-10 of column one on line 40

H. Page 30
  1. Net Worth Statement: Lines 1-23 of column one transfer from indicated pages
     (NOTE: should be the same as column two of past book)
  2. Progress Report: fill in columns 3-7 for proper year

I. Page 31
  1. End of Year Accuracy Check: fill in lines 1,17,26
  2. Livestock Analysis: fill in line 47 of proper columns

J. Page 32 Livestock Breeding, Production, and Mortality Record: transfer livestock still in breeding herd from past book to current book

INFORMATION SHEET

K. Pages 34,35 Livestock Production Record: fill in lines 1-9, columns 1 and 2 of proper enterprise

L. Pages 36,37 Feed and Labor Record: fill in kind and breed, numbers of animals in January, and ration componets

M. Page 38: draw map, make appropriate changes

N. Pages 39-42 Crop Record: fill in enterprise, field letter line 1 and 7, and practices

O. Page 43 Personal Goods: transfer and update

P. Page 49 Long Range Plans: fill in years and goal columns for next three years

II. Check Total Book

A. Check all pages for neatness

B. Check all pages for correct figures

PLANNING AND IMPLEMENTING THE SUPERVISED TRAINING PROGRAM FOR AGRIBUSINESS

UNIT XI

TERMINAL OBJECTIVES

After completion of Unit XI, the student should be able to select an agribusiness job from the various types of jobs available, establish goals for his four years in Vocational Agriculture, and set ways and means of reaching those goals. The student should be able to apply the fundamentals of beginning record keeping. Each student involved should complete the record book with all business figures 100 percent accurate. The information pages in the record book should be 90 percent accurate.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Complete the sheet titled "Other Information" for agribusiness
2. By using the supervised occupational experience agreement example, complete the student's own agreement
3. By using the example on the candidates occupational objective page, complete his/her own plan for his/her occupational objectives
4. By using the specific experience example complete his/her plan for specific experiences to be gained.
5. Complete the agribusiness record book to the teachers satisfaction.

PLANNING AND IMPLEMENTING THE SUPERVISED TRAINING PROGRAM FOR AGRIBUSINESS

UNIT XI

SUGGESTED ACTIVITIES

(NOTE: this unit is designed for individualized students having programs in agribusiness)

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Evaluate completed assignment sheets
6. Give additional sheets for record book

Students:

1. Read objectives
2. Study information sheets
3. Complete assignment sheets
4. Hand in completed assignment sheets for evaluation
5. Staple completed assignment sheets in record book

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Assignment sheets
    - #1 - Other information
    - #2 - Occupational objective page
    - #3 - Specific experiences to be gained
    - #4 - Supervised occupational experience agreement

References:

1. Kansas Farm Record Book
2. National Proficiency Awards for 1974-75: Placement in Sales and Services; Placement in Processing; American Farmer and Agribusinessman.

PLANNING AND IMPLEMENTING THE SUPERVISED TRAINING PROGRAM FOR AGRIBUSINESS
UNIT XI

INFORMATION SHEET NO.1

Candidate Occupational Objective: to become the manager of the Uniontown Implement Sales and Repair Shop.

What it will take to reach this occupational objective	Plans for reaching occupational objectives	Extent of experiences already received in reaching occupational objective
Experience 1. Work in as many areas in this field so my training experiences will start me on my way towards my career goal of managership of the Implement Shop	Work for dealer in Uniontown while in high school during the school year and extend into summer employment	I am currently employed by the dealer in Uniontown and have set up a 4 year plan of experiences to be completed here and have an agreement with Mr. Smith for summer employment and after two years of Vo-Tech I plan to return as a mechanic in the shop
Education 2 years Vo-Tech and major in mechanics	Plan to attend Vo-Tech for 2 years and major in mechanics	Three months working for dealership
Cost $300 plus room and board	Save money earned while on the job to finance education	Earned $396 while in employment at shop (9/1 - 12/31) Saved
Other		

INFORMATION SHEET

Specific experiences to be gained: indicate the specific experiences to gained that will assist in achieving your desired career goal.

Occupational objective: Manager of a farm implement sales and repair shop

Name of business in which agribusiness experience is obtained	Specific Fxperience and/or Skills Developed	Indicate how each experience will assist you towards achieving your occupational goal
Uniontown implement Sales and Repair Shop	1. Organization of shop area and tools	a. Realizing the value of a clean shop b. Understand the value of proper tool location c. Training in organizing the repair shop

Ag. IV 299-A

Replaces Page 7 in Record Book

INFORMATION SHEET

Supervised Occupational Experience Agreement:

EXAMPLE

Starting date: 9/1/74

Ending date: 8/21/78, with chance for employment while in Vo-Tech and also after completion of schooling

Hours: 2 hours after school each day with 8 hours on Saturday: 44 hours during summer each week with three weeks off

Wages: start at $1.90 per hour with increase of $.05 per hour each two months up to $2.60 per hour while in school

Experiences:

1. Learn the responsibilities towards the company
    a. Attitude
    b. Communications
    c. Employee economics
2. Organization of shop area and tool storage
3. Learn to be a mechanic's helper and take directions
4. Procedures in loading and delivering machinery
5. Repair and assembling machinery problems
6. Learn to read repair and parts manuals, and locate parts in storage
7. Learn to start, keep and price a customer's bill
8. Learning to order parts and check in
9. Develop skills in salesmanship of products

PLANNING AND IMPLEMENTING THE SUPERVISED TRAINING PROGRAM FOR AGRIBUSINESS

ASSIGNMENT SHEET #1 - OTHER INFORMATION

Date entered high school________________________________

Years of vocational agriculture offered in high school_________

Years of vocational agriculture completed____________________

Enrolled in vocational agriculture (yes,no)__________________

Parents name, if living Father____________________________
Mother____________________________

Number of brothers______, ages__________________________

Number of sisters______, ages__________________________

Father's Occupation___________________________________

ASSIGNMENT SHEET #2 - OCCUPATIONAL OBJECTIVE PAGE

NOTE: No supplemental pages are to be added except pages for photographs

Qualifying Programs: Programs that provide exploratory experiences and to develop occupational competencies needed by individuals preparing to enter the occupations of Sales and Service in off-farm agriculture. Experiences may be in feed and other farm supply stores, agricultural equipment dealerships, lumber and building supply stores, florist shops, garden centers and landscape maintenance firms (For more information on this program, please consult your chapter Agricultural Proficiency Award Guide.)

A. Applicant's Vocational Objective: (To be completed by the applicant) State your ultimate career goal and your plan for achieving this goal. This section will not be scored by the judges, its only purpose is to define the basis for the experiences you received through your experience program.

Candidate's occupational objective ______________________________

What it will take to reach this occupational objective	Plans for reaching occupational objective	Extent of experiences already received in reaching occupational objective
Experience:		
Education:		
Cost:		
Other:		

ASSIGNMENT SHEET #3 - SPECIFIC EXPERIENCES TO BE GAINED

Indicate the specific experiences to be gained that will assist in achieving your desired career goal.

Name of Business Agribusiness experience is obtained	Specific experience and/or skills developed	Indicate how each experience will assist you towards achieving your occupational goals

ASSIGNMENT SHEET #4

SUPERVISED OCCUPATIONAL EXPERIENCE AGREEMENT

Starting date:______________________________

Ending date:______________________________

Hours:______________________________

Wages:______________________________

Experiences:______________________________

CO-OPS IN AGRICULTURE
UNIT XII

TERMINAL OBJECTIVES

After completion of Unit XII, the student should be able to name the forms of business in the United States and identify their features of doing business. He should be able to describe an agricultural co-op and its distinctive features for doing business, as well as identify the groups of co-op employees with the function of each. He should be able to identify patron services and distinguish services provided by components of the cooperative credit system. To demonstrate his knowledge, the student will score at least 85 percent on the unit post-test.

SPECIFIC OBJECTIVES

After completion, the student should be able to:

1. Name the forms of business
2. Identify the features of doing business with the forms of business.
3. Describe an agricultural cooperative.
4. Describe three distinctive features in the operation of a co-op.
5. Identify the groups of business people involved in the operation of a co-op with the responsibilities of each group.
6. Identify terms associated with financing a cooperatively owned business.
7. Identify those services which are marketing, purchasing and specialized, or which contribute to conveniences such as comfort, safety, and health.
8. Distinguish the types of services provided by each of the three components of the cooperative credit system.

CO-OPS IN AGRICULTURE
UNIT XII

SUGGESTED ACTIVITIES

Instructor:

1. Make transparency
2. Provide students with objective sheets - terminal and specific
3. Discuss terminal and specific objectives
4. Provide students with information and assignment sheets
5. Discuss information and assignment sheets
6. Assist students as needed in meeting the requirements of each objective
7. Discuss additional assignments with students
8. Give Test

Student:

1. Read objectives - terminal and specific
2. Study information sheets
3. Review the requirements of each objective until confident that performance requirement can be met.
4. Complete the additional assignment
5. Take test

INSTRUCTIONAL MATERIALS

Provided with unit:

1. Objectives
2. Information sheets
3. Transparency master
    TM 1 - Methods of Doing Business Under Private Enterprise
4. Assignment sheet
    #1 - Inquiring About a Cooporative
5. Test
6. Answers to Test

References:

1. Student handout materials
2. Cooperatives in Agribusiness, Educational Circular 33, Farmer Cooperative Service, United States Department of Agriculture.

CO-OPS IN AGRICULTURE
UNIT XII

INFORMATION SHEET

I. **Forms of business in the United States (Transparency 1)**

   A. Individually owned--the owner-operator makes the decisions and assumes all risks for example, farming where the person is sole owner and operator

   B. Partnership--a business owned by two or more people who operate a business together on terms agreeable to all partners, for example, father-son partnership in a farming operation

   C. Corporation

      1. Investor-orientied corporation--capital funds are secured from sale of stock to investors who hope to make a profit on their investment

      2. Cooperative corporation--this corporation exists to perform specific services and render economic benefits to members. Part or all of capital is provided by member

II. Description of agricultural cooperatives

   A. Structure

      1. It is a form of business firm

      2. It physically resembles any other firm performing the same types of things or providing similar services.

      3. It employs the same kinds of personnel in similar jobs

      4. It usually charges about the same prices for products or services and pays about the same for products marketed through it

   B. Special traits of a co-op

      1. Its purpose is to serve needs of its members so they may realize higher incomes, lower costs, and become more efficient and/or receive dependable services

      2. It is composed of members having similar interests and desires

      3. A co-op is owned and controlled by member patrons who are obligated to patronize it through voluntary or legally binding contract. Obligation depends on type of service provided by the co-op, willingness of members to bind themselves in writing, or the requirements of the co-op

4. The net margin over cost of carrying on the business is returned as a patronage refund, which is in proportion to patrons use of services and/or products

III. Distinctive features in operation of a co-op

A. Democratic control

1. Final control rests with member who uses co-op and who attends and votes at co-op meetings

2. One vote allowed per member with allowances for additional votes in some co-ops based on patronage during previous year

B. Limited returns

1. Certain federal and state laws limit dividends on stock or voting or both

2. Capper-Volstead Act states that co-ops must either limit dividends on stock of membership capital to 8% or less, and limit voting to one vote per member

3. Non-members can not receive product services in a greater amount than members

4. Investment restrictions discourage exploitation or control of a co-ops by persons interested only in organization control or investment returns

C. At cost operation

1. A co-op generally does not retain excess of gross proceeds over expenses (profit) if organization papers include a provision to return excess over costs to member patrons

2. When excess is returned, co-op is operating at cost

3. Federal income tax laws (Revenue Act of 1962) contain the criteria for meeting tax obligations on excess over costs (profits - paid by member or paid by co-op)

IV. Groups of business people involved in operation of a co-op and their responsibilities

A. Directors

1. Represents members

2. Sets policy

3. Responsible to members for efficient operation of co-op

4. Hire manager

5. Decides what co-op will do to accomplish purposes

6. Decide how patronage refunds will be distributed in cash or off-set against obligation of each patron to invest additional capital

7. Make financial decisions

8. Usually receives compensation for services

B. Manager key assistants

1. Decides how to best carry out wishes of board of directors subject to board review

2. Management assistants (specialists) vary in number according to size of co-op and services provided such as marketing specialist, purchasing specialist, etc.

3. Manager's principal tasks are planning, conferring with members of management team, maintaining good organizational relations, and controlling co-op operation

4. Manager is key person between staff and board of directors and makes necessary operational and planning reports to them

C. Clerical and operating employees--Vary in title, task, and number according to type of services and products, for example, billing clerk, cashier, truck driver, or field man, or warehouseman.

D. Member patrons

1. At annual meeting ask questions, make comments, request changes in services and products, or request new services and products

2. Elect members to replace those where terms have expired on the board

3. Must use co-op services and products to keep it alive

4. Serve on committees and in other ways to benefit the co-op

V. Definition of terms associated with financing cooperatively owned business

A. Capital stock organization - members receive stock certificate as evidence of ownership; shares are usually low in par value, for example, $5, $10, $20

INFORMATION SHEET

1. Preferred stock - usually non-voting stock holders

2. Common stock - usually the voting stock holders

B. Non-capital stock organization

1. Some kind of certificate issued to show contributions of member

2. Some non-stock co-ops raise some or most of their original capital by membership fees

C. Capital needs - monies to meet fixed costs and operating costs of co-op

1. Fixed money for land, buildings, and equipment

2. Operating money needed to keep the business going, for example, advances to members for products marketed: obtaining farm supplies; paying employees; paying light, water, and heat bills; purchasing operating supplies such as cartons or office supplies

D. Operating loans

1. Generally short-term loans used to supplement co-ops own capital funds

2. Short-terms are usually seasonal in nature to finance increases in inventories and accounts receivable

E. Commodity loans

1. Used to pay an advance to members who have stored products such as grain or frozen citrus concentrate for short or long periods of time

2. May also be used to make advances to members before their products are sold

F. Revolving capital financing

1. Money collected by co-op in business transactions with patrons and credited to members accounts

2. Portion of monies the co-op has accumulated from patron member is used as a revolving fund for capital purposes or members may furnish capital based on dollar value or physical volume of products bought or sold

3. Member patron is issued a statement sharing total investment in co-op capital for year

INFORMATION SHEET

4. Member equity in proportion to amount of business

5. Revolving fund repayment dates are generally in periods of 5, 7, or 10 years, so withdrawing patrons may redeem capital without impairing capital structure

G. Reserves

1. Monies to meet unexpected crises such as a poor year and monies to meet large planned outlay such as a building program or addition of new services

2. Valuation reserves - depreciation which is charged to operation on a pro-rated basis (so much per year for life of a building)

3. Capital reserves usually built up from net operating margins

VI. Co-op services

A. Marketing

1. Co-ops store, transport, advertise, promote, sell products for their members

2. By paying producers on the basis of grade and quality co-ops encourage farmers to produce the kind and quality of products that are in demand

3. They are a valuable bargaining tool for farmers

4. They negotitate with canners, packers, processors in such matters as price, quality, and time of harvest or delivery, thus extending control over a product at least one step further as it travels to the consumer

5. Some co-ops bind their members by contrast to market through them

B. Purchasing

1. Members of purchasing co-ops are usually free to purchase where they please

2. Efficiency and reduced per unit cost associated with large volume purchasing and manufacturing are passed on to member patrons in the form of patronage refunds at close of fiscal year

3. Major objectives of purchasing co-ops are:

a. To effect savings for member patrons through quantity

INFORMATION SHEET

b. To procure the type and quality of supplies best to members needs

c. To provide related services that meet the needs of member patrons

C. Specialized

1. This encompasses a wide variety of services, for example, pest-control co-op among California fruit growers; cooperative farmers markets; [illegible] processing cooperative for dairymen; machinery use cooperative; mutual irrigation companies, especially in Western states; grazing associations on public lands and national forests

D. Convenience co-ops

1. Comfort - This includes a variety of cooperative activity, such as Rural Electrification Administration (REA). Through cooperative efforts by the people who owned them, unserved rural areas received electric power and telephone service. Another self-help example for serving rural needs is the credit union. CUNA International, Inc. (formerly Credit Union National Association) a world-wide credit union, serves credit unions all over the world

2. Safety - An example of safety is fire insurance, Mutual fire insurance companies handle over 50% of all fire insurance coverage on farm buildings in the U.S.

3. Health - Rural health cooperatives have been established in sparsely settled areas by members who pooled their resources to build clinics, attract good doctors and devise medical programs keyed to needs and incomes of members. Also, people in a number of communities have been able to provide special medical services, equipment and medicines through cooperative effort

VII. Services provided by each of the three components of the cooperative credit system

A. With the help of federal legislation, beginning in 1917, farmers have developed a cooperatively owned credit system for obtaining funds for many of their credit needs

B. The three components are:

1. Twelve Federal Land Banks and over 600 local affiliated Land Bank Associations. They supply about 25 percent of farmer's long-term credit

INFORMATION SHEET

2. Twelve Federal Intermediate Credit Banks with over 400 local affiliated Production Credit Associations (PCA). Intermediate credit banks make no direct loans to farmers. Instead they are banks of discount credit wholesalers. To make more money available to farmers, local PCA's were established with help from the intermediate credit banks. They provide about 20 percent of the short-term operating and intermediate-term credit for capital improvements used by farmers

3. Credit Bank for Cooperatives and 12 district banks for cooperatives. These banks provide specialized credit and business service at cost. They provide 50 percent of the credit used by farmers. Farmer cooperatives who borrow must perform one or more of the following.

   a. Processing, preparing for market, handling, and marketing farm products

   b. Purchasing, testing, grading, processing, distributing, or furnishing farm supplies

   c. Furnishing farm business services

METHODS OF DOING BUSINESS UNDER PRIVATE ENTERPRISE

Features Compared	Types of business			
	Individual	Partnership	Corporation	
			Investor-Oriented	Cooperative
1. Who uses the services?	Non-owner customers	Generally non-owner customers	Generally non-owner customers	Chiefly one owner patrons
2. Who owns the business?	The individual	The partners	The stockholders	The memberpatrons
3. Who votes?	None necessary	The partners	Common stockholders	The memberpatrons[1]
4. How is voting done?	None necessary	Usually by partners' share in capital	By shares of common stock	Usually one-member one-vote
5. Who determines policies?	The individual	The partners	Common stockholders and directors	The memberpatrons and directors
6. Are returns on ownership capital limited?	No	No	No	Yes--8% or less (usually less, if any)[1]
7. Who gets the operating proceeds	The individual	The partner in proportion to interest in business	The stockholders in proportion to stock held	The patrons on a pagronage basis[1]

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[1] Basic cooperative principles

CO-OPS IN AGRICULTURE
UNIT XII

ASSIGNMENT SHEET #1 - INQUIRING ABOUT A COOPERATIVE

For your county determine how many different co-ops provide services or handle products for patrons.

For one of the co-ops, secure the following information:

1. Name of co-op
2. Year co-op was organized
3. Membership requirements
4. Types of services provided and/or products handled for patrons.
5. Names and addresses of members of Board of Directors
6. Name of manager
7. Names of key assistants and job titles
8. Approximate membership
9. Frequency and dates of membership meetings

CO-OPS IN AGRICULTURE
UNIT XII

TEST

1. Name the three forms of business

   a.

   b.

   c.

2. Identify the features of doing business by placing in each blank an "I" if individually owned, a "P" if partnership, a "IOC" if investor-oriented cooperative, or a "CC" if cooperative corporation.

   a. Users of service

   _____1. non-owner cusomer
   _____2. chiefly owner-patrons
   _____3. generally non-owner patrons

   b. Owner(s) of business

   _____1. individual
   _____2. stockholders
   _____3. partners
   _____4. member-patrons

   c. How voting is done

   _____1. by shares of common stock
   _____2. usually one-member one vote
   _____3. usually by partners share in capital
   _____4. none needed

   d. Who determines policies

   _____1. the individual
   _____2. the partners
   _____3. common stock-holders and directors
   _____4. member-patrons and directors

   e. Who gets operating proceeds

   _____1. patrons on a patronage basis
   _____2. stockholders in proportion to stock held
   _____3. partners in proportion to interest in business
   _____4. individual

3. Describe an agricultural cooperative.

4. Describe each of the three distinctive features of a co-op.

   a. Democratic control

   b. Limited returns on invested capital

   c. Operation on a cost of doing business basis

5. Match each of the groups of people in a co-op with the responsibilities for each group.

   a. Directors
   b. Manager and key assistants
   c. Clerical and operating employees
   d. Member-patrons

   _____1. elect members to replace those whose terms have expired on the board.
   _____2. cashier, fieldman
   _____3. represents members, sets policy
   _____4. decides how best to carry out the wishes of the board, subject to board review.

6. Match terms associated with financing a cooperatively owned business with their meanings.

   a. Capital stock organization
   b. Non capital stock organization
   c. Capital needs
   d. Operating loans
   e. Commodity loans
   f. Revolving capital financing
   g. Reserves

   _____1. used to pay an advance to members who have stored products such as grain
   _____2. money to meet fixed costs and operating costs
   _____3. members receive stock certificates as evidence of ownership
   _____4. money collected by co-op in business transactions with patrons and credited to their accounts.
   _____5. money to meet unexpected crises and to meet large planned outlay
   _____6. some kind of certificate issued to show contributions of members
   _____7. generally short-term loans used to supplement co-ops own capital funds.

7. Before each of the words or phrases place the letter of the co-op term that identifies it. Terms may be used more than once.

a. Marketing
b. Purchasing
c. Specialized
d. Comfort
e. Safety
f. Health

______1. rural electric co-op
______2. negotiate with processors
______3. reduced per unit cost
______4. pest control
______5. date-processing co-op
______6. allows communities to provide specialized medical services
______7. fire insurance
______8. rural telephone co-op
______9. resource pooling to build clinics
_____10. product promotion

8. List the type(s) of services provided by each of the three components of the cooperative credit system.

a. Federal Land Bank and local affiliates

b. Federal Intermediate Credit banks and Local PCA's

c. Central Bank for Cooperatives and District banks

CO-OPS IN AGRICULTURE
UNIT XII

ANSWERS TO TEST

1. Forms of business
   a. Individually owned
   b. Partnership
   c. Corporation (if subdivided - invested - oriented & cooperative)

2. Features of doing business.

a. I 1.
CC 2.
P 3.

b. Owner(s) business
I 1.
IOC 2.
P 3.
CC 4.

c. How voting is done
IOC 1.
CC 2.
P 3.
I 4.

d. Who determines policies
I 1.
P 2.
IOC 3.
CC 4.

e. Who gets operating proceeds
CC 1.
IOC 2.
P 3.
I 4.

3. Description may include:

One form of business; resembles any other firm providing similar services; similar employees in similar jobs; prices and services about the same as similar firms; purpose - to serve member needs; members have similar interests and needs; owned by member patrons; net margin over costs returned as patronage refund.

4. Description of distinctive features may include:

    a. Democratic control - final control with member who use services, one-member, one-vote with some having additional votes based on previous year's patronage.

    b. Limited returns - returns on stock or voting limited by Federal and State laws; Capper-Volstead Act limits dividends to 8 percent or voting to one vote; non-members can not receive services in excess of members.

    c. At cost operation - usually co-op does not retain excess over costs; organization papers provide for distribution of excess; revenue act of 1962 contains taxing criteria on excess monies.

5. Groups of business people in a co-op and their responsibilities (matching)

    d 1.
    c 2.
    a 3.
    b 4.

6. Match terms associated with co-op financing and meanings.

    e 1.
    c 2.
    a 3.
    f 4.
    g 5.
    b 6.
    d 7.

7. Terms identifying co-ops (matching).

    d 1.
    a 2.
    b 3.
    c 4.
    c 5.
    f 6.
    e 7.
    d 8.
    f 9.
    a 10.

8. Services provided by components of cooperative credit system include:

    a. Federal Land Bank and local affiliates - supply about 25% of long-term credit for farmers.

    b. Federal Intermediate credit Bank and local PCA's - Intermediate credit banks are discount credit wholesales and do not make direct loans to farmers. PCA's provide about 20 percent of short-term operating credit and intermediate-term credit for capital improvements used by farmers.

ANSWERS TO TEST

c. Credit Banks for Cooperatives and 12 District Banks for Cooperatives provide specialized credit and business service at cost. Farmer cooperatives who borrow must meet one or more specified criteria in processing, marketing, purchasing, testing, grading, distributing farm supplies, or furnishing farm business services.

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

TERMINAL OBJECTIVES

After completion of Unit I, the student should be able to define terms associated with a program of activities, select the major divisions of the FFA program, and match the chapter activities with the proper division. He should be able to list the parts that are included in a program of activities form and select factors that contribute to a satisfactory program of activities. This knowledge will be evidenced by scoring eighty-five percent on a unit test

SPECIFIC OBJECTIVE

After completion of this unit, the student should be able to:

1. Define terms associated with the FFA program of activities.
2. Select from a list the benefits of having a well planned program of activities.
3. Select from a list the major divisions of the FFA program of activities.
4. List the parts that a program of activities form should contain.
5. Select the factors that contribute to a satisfactory program of activities.
6. Select from a list the steps to follow in constructing and conducting a program of activities.
7. Match the chapter activity with the proper divisions within the program of activities.
8. Develop a FFA program of activities.

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Assignment sheet
   #1--Develop a FFA Program of Activities
4. Test
5. Answers to test

References:

1. Official FFA Manual for the National Organization for Students of Vocational Agriculture. Alexandria, Virginia, 1975.

2. FFA Activity Handbook, 1974-75; National FFA Supply Service, P.O.,Box 15159; Alexandria, Va. 22309.

3. National FFA Organization. Chapter Guide to FFA Activities 1974-75, National FFA Supply Service; P.O., Box 15159; Alexandria, Va. 22309.

4. Advisor Handbook, National FFA Supply Service; P.O.,Box 15159, Alexandria, Va., 22309.

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

INFORMATION SHEET

I. Terms and definitions

A. Program of activities--Outline of activities covering a definite period which includes specific goals, ways and means of reaching these goals, and provisions for checking on the accomplishments

B. Executive committee--Committee made up of chapter officers and the chairman

(NOTE: In smaller chapters the officers usually make up the executive committee.)

C. Sub-committee--Members other than the chairman that make up a committee within the program of activities

(NOTE: Sub-committee members should be chosen according to their interests.)

II. Benefits of a well planned program of activities

A. Include goals that serve as a means of directing the chapter activities in a positive manner

B. Provide school administration and community with a better understanding of the local chapter

C. Provide opportunity for members to use and develop skills taught in vocational agriculture

D. Point out the vital part FFA has in a vocational agriculture department

E. Necessary for proper chapter recognition on the local, state, and national level

F. Represent the combined thinking of a majority of the members and involves every member

III. Major divisions of the FFA program of activities

A. Supervised agricultural occupations experience

B. Cooperation

C. Community service

D. Leadership

E. Earnings, savings, and investments

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- F. Conduct of meetings
- G. Scholarship
- H. Recreation
- I. Public relations
- J. Participation in state and national activities
- K. Alumni relations

IV. Parts of a program of activities form

- A. Division of the program of activities
- B. Activities to be participated in under the division
- C. Names of the committee members who will be responsible for each activity
- D. Goals to be accomplished under each activity
- E. Ways and means of reaching each goal
- F. Accomplishment information upon the completion of each goal

V. Factors that contribute to a satisfactory program of activities

- A. Sufficient time given to evaluate, plan, and organize chapter activities
- B. Final program of activities are planned early in school year
- C. Resource personnel used in program planning and evaluation
- D. Challenging and practical goals selected and based upon interest and needs of the members, school, and community
- E. A well developed, realistic, and workable ways and means
- F. Committee organization and membership cooperation
- G. Adequate financing provided for all activities
- H. All members realize it is their program and are involved
- I. Review of the calendar of activities with the school administrator
- J. Program of activities displayed on a wall chart or each member has a copy

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VI. Steps in constructing and conducting a program of activities

- A. Have continuous and periodic evaluation of the chapter activities
- B. Have executive committee, under the guidance of the advisor, appoint the program of activities committees
- C. Choose subcommittee members according to their interests insofar as possible
- D. Encourage vice-president to meet with each committee to assist them in formulating their phase of the program of activities
- E. From copies of the programs of activities of the state association and the national organization, select and list items to be included in the chapter program
- F. Secure copies of other chapter programs and get ideas on other suitable program ideas
- G. Have the committees on program of activities report back regularly to the chapter
- H. Instruct the vice-president to keep informated on committee progress and to make regular reports to both the president and advisor
- I. Direct the reporter to record the chapter accomplishments on the program of activities wall chart or on a regular activity report form

VII. Chapter activities included in each major division

- A. Supervised agricultural occupations experience
  - 1. Chapter sponsors activities that increase the scope of the supervised occupational experience programs of the members

    Examples:

    - a. During the summer before entering the vocational agriculture program, have a meeting with the parents, students, and advisors to discuss a supervised occupational experience program
    - b. Explain the value of record keeping to parents and students
    - c. Visit programs of outstanding members and former members such as State Farmers and American Farmers
    - d. Provide a chapter loan program and invite a loan association representative or other knowledgeable person to discuss loans

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   e. Show films of agricultural subjects; some good sources for agriculture of FFA films are: The Venard Organization, Peoria, Illinois 61611; Modern Talking Pictures Service, 1212 Avenue of the Americas, New York, New York 10035; and Farm Film Foundation, 1425 H Street, N.W., Washington, D.C. 20005

   f. Conduct tours of leading commercial operations that relate to the agricultural industry

   g. Maintain a chapter bulletin board with a list of available jobs as determined by surveys and newspaper help wanted ads

   h. Contact local employment agencies and other agricultural agencies to locate work experiences for the members

   i. Arrange for urban students to have a place for projects such as school farm, greenhouse, or others

   j. Establish a rental system whereby students rent production space (4 x 12 foot plot for horticulture or one acre plots for school farm); set a yearly or monthly rental fee to give students experience in rental and bookkeeping; student is responsible for everything in his plot

   k. Establish supplementary programs such as beekeeping, fish farming, rabbits, and others

2. Conducts activities which improve the quality of the supervised occupational experience programs of its members

   Examples:

   a. Establish livestock chains

   b. Provide the opportunity for junior membership in breed associations

   c. Provide information concerning the use of artificial insemination

   d. Participate in shows, fairs, and livestock contests

   e. Establish a rent-lease agreement for agricultural equipment

   f. Conduct demonstration plot and animal experiments

3. Members conduct activities that promote plant and/or animal loss prevention

   Examples:

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a. Show a film on the use of proper sanitation practices--Some good sources are United States Steel; your State Health Department; and Breed Associations

b. Sponsor pesticide safety program--Some sources for materials are all major agricultural chemical companies, U.S. Food and Drug Administration, and U.S. Department of Agriculture

(NOTE: See FFA Safety Handbook for other sources and mailing addresses.)

c. Have veterinarian explain disease prevention and parasite control of livestock

d. Have Soil Conservation representative explain the proper use of chemicals on crops

e. Conduct gain and weight contests

f. Assist other agricultural agencies with animal health programs

g. Provide recommendations in harvesting, grading, storage, and marketing of crops

h. Conduct fertilizer and cultural demonstrations

4. Chapter conducts activities to improve agricultural mechanics occupational experiences of members

Examples:

a. Conduct tractor driving and maintenance contests

b. Sponsor mechanical skills contests

c. Make shop facilities available to members on a regularly scheduled basis

d. Attend agricultural machinery demonstrations

e. Arrange for students to receive work experience in agricultural mechanics by setting up working arrangements with local implement dealers

f. Arrange for local implement dealers to provide knocked down equipment to be assembled by agricultural mechanics class

5. Chapter recognizes outstanding supervised agricultural occupations experience programs

Examples:

   a. Estabilish "Grain Club"; trophies are presented to the top two producers in the club

   b. Provide shop project awards

   c. Participate in Soil Conservation Essay Contest

   d. Post progress charts on project supervision

   e. Post pictures of outstanding project enterprises

   f. Provide proficiency awards from national organization

B. Cooperation

1. Chapter sponsors cooperative purchasing and/or sales activities

   Examples:

   a. Combine member crop and livestock purchases to obtain financial savings through bulk rate prices

   b. Patronize and increase member involvement in local cooperatives

   c. Establish a record keeping cooperative and/or assist members in joining record keeping cooperative

   d. Establish and maintain a "Chapter Exchange" bulletin board with a current listing of items for sale or wanted

   e. Establish a community cooperative by selling supplies to local farmers at wholesale price

   f. Establish and operate a Junior Production Credit Association

2. Chapter provides agricultural services for members

   Examples:

   a. Establish a cooperative; draw up a constitution and by-laws, have participating chapter members serve as the board of directors, hire a member as the manager, sell shares on the basis of hours worked, declare dividends, and in general operate as a cooperative business; chapters have established cooperatives in several areas including:

      1) Chapter farm

      2) Livestock

      3) Crop

      4) Horticulture

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5) Beekeeping

6) Orchard spraying

7) Irrigation

8) Machinery

b. Establish a livestock breeding service cooperative

c. Establish livestock chain

d. Purchase and loan equipment needed by members

e. Join the state cattleman's association

f. Provide student assistants for USDA officials working with the screw-worm eradication program

3. Chapter conducts a demonstration in the community to promote good agricultural practices

Examples:

a. Assist with community tree planting efforts in areas needing reforestation

b. Provide student assistants to wildlife personnel for wildlife release or habitat improvement programs

c. Sponsor a chapter safety hazard search campaign

d. Provide a community soil testing service to area farmers

e. Establish a community tractor painting service for area farmers

g. Serve as guides and teachers for elementary school ecology and conservation tours and instruction

4. Chapter cooperates with other school organizations

Examples:

a. Establish an all-school summer job placement service

b. Prepare and distribute to area farmers and businessmen a list of students available for employment

c. Sponsor a barbecue for faculty members each fall

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   d. Serve as waiters for FHA banquet, build hurdles for athletic department, assist with talent show, and other similar activities

   e. Assist in keeping school grounds attractive and safe

5. Chapter cooperates with other organizations and agencies in the community

   a. Arrange for a chapter or class visit to a local or state cooperative facility

   b. Test new crop practices on demonstration plots in cooperation with farm supply, extension, and university specialists

   c. Sponsor a harvest festival, rodeo, tractor pull, or other special event in cooperation with local civic clubs

   d. Assist the local soil conservation district in conservation demonstrations with chapter members serving as junior supervisors

   e. Participate in crop and/or livestock improvement association activities

   f. Assist the local wildlife conservation officials in sponsoring a hunter safety program

   g. Assist the local machinery dealer with machinery assembly and testing

   h. Help local Red Cross with activities such as swimming safety, first aid, and blood collection drives

   i. Construct and operate a booth at the local festival or fair

   j. Assist area officials with senior citizen housing project

   k. Operate an official weather station in cooperation with the land grant college or the U.S. Weather Bureau

   l. Work with other organizations for Community Clean-Up Day

   m. Work closely with the FFA Alumni in providing scholarships, sponsoring fairs or shows, obtaining money for members to attend State and/or National Conventions, and other activities

   n. Participate in local, county, and state fairs: chapter and individual exhibits, fairgrounds preparation, and other activities

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6. Chapter sponsors at least one activity to promote a better understanding between residents within service area of school

   Examples:

   a. Establish a Mothers' Booster Club to assist with appropriate chapter activities such as suppers, banquets, and concessions

   b. Sponsor an all-school judging contest involving all students and faculty members

   c. Prepare pork, chicken, sweet corn, beef, or other agricultural products for special community events

   d. Sponsor an annual farmers' institute ro similar promotional event as part of the local adult and young farmer educational program

   e. Conduct a conservation tour for groups of all ages, and use chapter members as guides

   f. Provide effort and funds to complete needed school projects such as concession stand, equipment, or landscaping

   g. Assist school administration with new student and freshman orientation

   h. Provide members for parking cars at all school events

   i. Provide for needs of deserving families such as fuel, food, or money

   j. Contribute to worthwhile charities

   k. Prepare Christmas decorations for the local community

   l. Sponsor community field days in cooperation with extension and university officials

   m. Maintain a "For Sale" and "Wanted" bulletin board in community

   n. Establish demonstration plots in cooperation with seed, chemical and fertilizer companies

7. Chapter cooperates with other FFA chapters in conducting at least one activity

   Examples:

   a. Sponsor a livestock garden or shop project show

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   b. Conduct Greenhand and/or Chapter Farmer initiation with local area chapters

   c. Arrange for stopover visits of members enroute to various FFA events

   d. Combine actions of area chapters in promoting National FFA Week

   e. Exchange chapter members with another chapter

C. Community Service

  1. Chapter sponsors or assists with an agricultural show

     Examples:

     a. Sponsor a school fair, community fair, garden show, or livestock show

     b. Assist in sponsoring a community fair, home and garden show, livestock show, or youth fair, by providing publicity, department superintendent, setting up pens, offering facilities, or securing sponsors

     c. Help construct and/or repair facilities for local and/or county fair and similar events

  2. Chapter presents educational programs before community and community organizations

     Examples:

     a. Develop Children's Barnyard or Old MacDonald's Farm at local or county fair

     b. Set up displays and have demonstrations at local shopping centers, businesses, civic, agricultural, and/or youth organizations

     c. Provide information on jobs and new and improved agricultural practices by means of meetings, leaflets, bulletins, and cooperation with extension service

     d. Participate in Farm-City Week activities by providing publicity, welcome farms and displays, farm guides and other services

     e. Present speeches, demonstrations, panels, and/or slide series to community organizations explaining:

1) Agriculture in the community

2) The importance of agriculture

3) The activities of your FFA chapter

4) The activities of outstanding chapter members

3. Chapter assists charitable organizations and campaigns

Examples:

a. Conduct charity drives and donate money to: e.g. Heart Fund, Cancer, Christian Rural Overseas Program, March of Dimes, United Givers Fund, Red Cross, and others

b. Help needy families, disabled citizens, and/or senior citizens by performing chores, and supplying financial assistance

c. Help crippled children and/or retarded children by donating toys, tape recorders, or other needed equipment; or by helping with recreation and other activities

d. Donate FFA pens and pencils and other materials to hospital for use by shut-ins

e. Sing Christmas carols at county home and/or nursing home

f. Decorate nursing home or county home during Halloween and other special celebrations during the year

g. Organize community service projects in cooperation with local churches

h. Sell seeds, plants, etc., and donate the proceeds to crippled children

i. Raise plants in school greenhouse and give to hospital patients and shut-ins in the community

4. Chapter conducts a community safety program

Example:

a. Conduct a community safety program on agricultural machinery, electrical wiring, chemicals, and other potential community hazards

b. Conduct a school for the safe operation and maintenance of tractors and equipment

c. Conduct a safe tractor driving contest

d. Sponsor a dog clinic for vaccinations

e. Sponsor a pest control and extermination contest

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c. Develop a portable barnyard and take baby animals to elementary and/or deaf and blind schools

d. Serve refreshments for such groups as Honor Society, PTA, teachers'association, and others

7. Other suggested chapter activities

Examples:

a. Assist civic organizations in putting on July 4th celebrations by parking cars, supplying equipment and materials, assembling booths, and other similar activities

b. Erect church and civic club signs at edge of town

c. Develop a community products and/or occupations promotional brochure to show what the community has to offer

d. Organize a "career-at-home night" for high school students

e. Remove junked automobiles and roadside trash piles

f. Landscape and beautify community streets and public buildings

g. Organize a community emergency medical service

(NOTE: For a further list of community service ideas, see the BOAC chapter action guide.)

D. Leadership

1. Chapter provides members with leadership experience in public speaking

Examples:

a. Require all vocational agriculture students to write a speech and present it to the class

b. Video tape member's speech and replay for constructive criticism

c. Select members from each class to present speeches at other area chapters' meetings

d. Select local chapter public speaking winner to participate above chapter level

e. Present FFA Foundation recognition awards to class participants and local winner

f. Present speeches to local service clubs, radio, and others

g. Invite speech teacher, advisory committee members, and others to help judge speeches

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- h. Require all new members to participate in creed, extemporaneous, junior public speaking, or similar speaking contests

2. Chapter provides members with training in parliamentary law and experience in conducting meetings

   Examples:

   - a. Provide parliamentary procedure training to all vocational agriculture students through instruction and participation in parliamentary law activities
   - b. Conduct parliamentary procedure demonstration to other clubs and classes
   - c. Select team members and enter parliamentary procedure contest above the chapter level
   - d. Secure books for chapter library on parlimentary procedure and officer training
   - e. Conduct regular meetings according to accepted parliamentary procedure

3. Chapter provides training for officers and members

   Examples:

   - a. Hold mock meetings in class to provide training in leadership and parliamentary procedure for all students; draw situations at random for class to act on
   - b. Elect junior, greenhand, or class officers who operate some of the regular meetings
   - c. Participate in chapter, district, state, and national leadership training schools, conferences, or similar activities
   - d. Provide financial assistance to members attending leadership training camp schools, conferences, or similar activities
   - e. Invite State and National Officers to visit chapter Contact State Office or the National FFA Center, Box 15160, Alexandria, Virginia 22309
   - f. Provide officer leadership training program for other school organizations
   - g. Schedule a visit with officers of other community organizations for officer training
   - h. Participate and/or observe FFA executive meeting

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4. Chapter assigns responsibilities for each member in the program of activities

   Examples:

   a. Appoint all members to a program of activities committee at start of school year

   b. Select a committee chairman

   c. Select goals for the program of activities using the National Chapter Award Program application, previous chapter programs of activities, programs of activities, programs from other chapters, and the Official FFA Manual

   d. Write a program of activities during class time with assistance from other members

   e. Present written program of activities to president or vice president for approval

   f. Report committee accomplishments at each chapter meeting

   g. Schedule regular meetings of program of activities committees

   h. Post committee reports, activities, and accomplishments in the classroom

   i. Summarize year's activities and report to state for chapter and member recognition

5. Chapter members meet leadership requirements for advanced degrees

   Examples:

   a. Secure degree and award requirement materials for members

   b. Test members' knowledge of FFA and parliamentary procedure through FFA quizzes, parlimentary procedure demonstrations, and other similar activities

   c. Check application for requirements

   d. Have members fill out or update a state farmer application each year, keep leadership accomplishments up to date, and familiarize members with other advanced awards and degrees

6. Chapter point system for achievement

   Examples:

   a. Set up point system committee to select items for which points are to be awarded

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(NOTE: This would include attendance at meetings, participation in leadership activities, participation in community service, speeches, and other activities.)

- b. Use point system to select chapter Star Greenhand, Star Chapter Farmer, Leadership Award winner, and DeKalb Award winner

- c. Have each student keep a record of points earned each quarter or semester

- d. Require members to keep point system in student notebook and/or chapter file

- e. Points earned may be applied to:

    1) Purchase of FFA supplies

    2) Eligibility for chapter trip

    3) Student's grade

    4) Award plaque or certificate

E. Earnings, savings, and investments

1. Chapter earns money during the year to adequately support its activities

Examples:

- a. Commission selling projects

    1) Secure sponsors for FFA Calendar program

    2) Sell citrus fruit during Christmas season

    3) Maintain a gilt chain for chapter members

    4) Sponsor a local turkey shoot

    5) Have an ice cream social

    6) Sell pine seedlings for reforestation

    7) Have apple butter or cider sale during the fall

    8) Sell rat poison

    9) Sell slow moving vehicle signs

    10) Sponsor a school or community rodeo

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11) Sell Christmas cards

12) Sell hand tool sets

13) Have a community scrap iron drive

14) Invest in U.S. Savings Bonds

15) Conduct FFA raffle

16) Receive premium money from livestock shows

17) Hold magazine sales

18) Put on donkey basketball game

19) Organize a chapter cooperative with the chapter owning some shares

b. Production selling projects

1) Hold Christmas tree sales

2) Sell flowers and vegetable plants from chapter greenhouse projects (coordinate with local growers)

3) Operate a school nursery for classroom work and community sales

4) Sell hog troughs that were constructed in shop classes

5) Fix up used farm equipment and resell

6) Raise popcorn, dry down, package, and sell

7) Sell livestock, dairy, and poultry products

c. Cooperative selling projects

1) Sell fire extinguishers

2) Sell tickets to amateur show

3) Sell tickets to community barbecue

4) Sell certified seed potatoes

5) Put on a pancake and sausage supper

6) Put on an oyster feed

7) Sponsor a horse show

8) Sponsor wood cutting bee or contest

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- d. Selling a service to others
    - 1) Run concession stand during sports activities
    - 2) Obtain a dealership for seed corn
    - 3) Operate an equipment rental service
    - 4) Auction members for a day's labor
    - 5) Run a chapter land laboratory and produce crops for experience and profit
    - 6) Provide landscape service to area home owners
    - 7) Sponsor a car wash

2. Chapter investments to broaden the scope of chapter activities

   Examples:

    - a. Provide loans to younger members
    - b. Purchase chapter equipment
    - c. Buy U.S. Savings Bonds
    - d. Purchase shares in local cooperative
    - e. Purchase land for chapter
    - f. Maintain livestock chain
    - g. Provide speakers for chapter activities
    - h. Finance leadership training
    - i. Provide a chapter scholarship for a graduating senior
    - j. Donate money to State and/or National FFA Foundation

3. Chapter conducts activities to encourage savings and stimulate investments among members

   Examples:

    - a. Use official record books and materials
    - b. Prepare yearly budget and submit to chapter
    - c. Maintain treasurer's book and audit monthly

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d. Recognize members who practice thrift

e. Provide board of education with copy of budget and net worth statement

f. Have representatives from a commercial bank, Production Credit Association, Farmers Home Administration, Federal Land Bank, and agribusinessmen speak on proper credit procedures

F. Conduct of meetings

1. Chapter uses appropriate official cermonies

   Examples:

   a. Use official ceremonies as written in the FFA manual

   b. Have officers memorize their parts in ceremonies

2. Chapter maintains a current file of FFA materials

   Examples:

   a. Establish a filing system that can be understood by members

   b. Assign responsibility for maintaining the file to the chapter secretary or other designated member

   c. Post a file index guide near the cabinet

   d. Review materials annually and replace outdated data

3. Chapter uses recommended procedures in keeping chapter records

   Examples:

   a. Use official secretary and treasurer books

   b. Provide at least simulated experience in financial record keeping for the treasurer

   c. Provide an "officer's office" or other suitable place for keeping chapter records

   d. Require secretary to have the meeting minutes up to date

   e. Submit treasurer's book to auditing committee

4. Arrange to have a regularly scheduled meeting time

   Examples:

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a. Prepare meeting time and dates on school calendar with approval of school administrators

b. Notify in advance all teachers who may be inconvenienced by the absence of students during FFA meetings

c. Schedule FFA evening meetings when possible

d. Hold at least one meeting each month at a regularly scheduled time

e. Start on time and establish a definite time limit for meeting

f. Send a "we missed you at the last meeting" postcard to the home of each member not present for scheduled meeting or activity

g. Provide a copy of meeting agenda to the school administration

h. Assign a chapter member to responsible for maintaining the official scrapbook

5. Invite an FFA officer above the chapter level to visit the chapter

Examples:

a. Arrange to conduct an FFA meeting while the officer is present

b. Introduce the officer to school personnel and businessmen in the community

c. Have officer speak to the chapter officers on the role of an FFA officer or other suitable topics

d. Take the officer to visit members' homes

e. Have officer participate in school assemblies, chapter banquet, and/or other similar activities

6. Use nominating committee in election of officers

Examples:

a. Use graduating senior officers and/or graduating seniors as committee members

b. Include representatives from freshman, sophomore, junior and senior classes on the committee

7. Chapter encourages graduates to retain their active FFA membership

Examples:

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a. Send a self-addressed, stamped envelope, and an invitation for membership to graduates

b. Pay part or all of the graduate's membership dues

c. Notify graduate members of FFA meetings with a postcard or phone call

8. Other suggestions

Examples:

a. Recognize members with perfect attendance at meetings

b. Hold orientation meeting for prospective members

c. Invite parents to attend at least one regular meeting

d. Elect a chaplain and have devotions at each meeting

e. Elect officers for the coming year before the end of the current school term

f. Keep chapter official paraphernalia displayed in chapter meeting room

g. Provide each member with an agenda prior to the meeting

h. Schedule a meeting of the executive committee to plan agenda

i. Schedule regular meeting periods for committee work

j. Establish FFA "Buddy System"; upperclassman arrange for transportation of young member to meeting, introduce new members to chapter officers, and assist new members with their projects

k. Hold executive committee meetings at a local restaurant, or member's or advisor's home, with chapter picking up the tab

l. Arrange a retreat for the executive committee

G. Scholarship

1. Chapter sponsors activities to encourage scholarship among the members

Examples:

a. Require members running for chapter offices to have at least a "C" average

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b. Present an award to the member with the best grade point average in agriculture

c. Present an award to the member who has shown the most progress--Consider attitude, improvement, participation, etc.

d. Provide a college scholarship to the graduating senior FFA member who has the highest grade point average and is planning to attend college

e. Secure sponsors from the community for scholarship awards

f. Use scholarship as one criteria for selecting the "Star Greenhand" and "Star Chapter Farmer" Awards

g. Have eligible members seek admission in the National Honor Society

h. Invite former members, National Honor Society members, and/or school administrators, to speak to the chapter on scholarship

i. Have chapter officers challenge other school organization officers to some scholastic competition such as a debate

j. Present DeKalb Award to senior who has the most outstanding scholastic and activities record

k. Organize tours to sites of educational merit such as a library or a college

l. Have successful scholars from upperclassmen assist students who are having scholastic problems

m. Post an honor roll in the classroom each grading period listing members who have a "B" or better grade average

n. Sponsor an "Ag Diction" or "Ag Terminology" contest

(NOTE: Members learn agriculture terms and are tested. Points are given on terms learned.)

2. Chapter maintains a file of current information concerning agricultural careers, occupations, and educational opportunities

Examples:

a. Maintain a chapter library of current books, trade publications, bulletins, and pamphlets dealing with agriculture and/or the FFA

b. Appoint a chapter librarian

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c. Compile a file of materials concerning careers in agriculture

d. Request the chapter advisor to include in his course of study a unit concerning agricultural careers

e. Set up a "Career Day" for chapter members, utilizing professional agriculturists, former members, other businessmen, and guidance counselors

f. Arrange and finance a tour for juniors and seniors to a college and/or a vocational-technical center

g. Organize and finance a "short course" on some agricultural problem in the community; invite the public to participate

h. Award travel allowances to members who are participating in agricultural student exchange programs

i. Attend the Agricultural Career Show at the National FFA Convention in Kansas City

j. Work closely with guidance counselor to keep him informed of opportunities in agriculture

k. Invite school counselor to attend the National FFA Convention and the Agricultural Career Show--He may attend in place of the local FFA Advisor

3. Chapter provides a file of current information concerning scholarships and other financial assistance for post high school study

Examples:

a. Request the director of student affairs at each state college and university to send the chapter and guidance office a list of available grants, loans, and scholarships

b. Invite the school guidance counselor to speak informally with junior and senior members who are interested in securing student financial assistance

H. Recreation

1. Chapter provides organized recreational activities

Examples:

a. Sponsor a field day of athletic competition in cooperation with other FFA chapters and award prizes

b. Organize a basketball, softball, or baseball team for intramural participation

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c. Conduct a ping pong or similar indoor sports tournament

d. Arrange for a skating, bowling, boating, swimming, or similar party

e. Hold a chapter rodeo, snowmobile race, shooting contest, or similar event

f. Go on a fishing trip--Award a prize for the biggest fish

g. Sponsor a fishing derby for the public

2. Chapter provides organized social activities

Examples:

a. Sponsor a trip to a sporting event

b. Have a barbecue or picnic for FFA members and their guests

c. Conduct a holiday party in cooperation with the FHA or other school group

d. Sponsor a hayride for chapter members and guests

e. Sponsor an educational tour to a farm, business, industry, university, or other place of interest to members

f. Hold a chapter "retreat" or camp

3. Other suggested activities

Examples:

a. Take a summer trip to different areas of the state

b. Visit a museum of interest to members

c. Conduct a tractor rodeo observing safety regulations

d. Arrange for a Christmas caroling activity

e. Participate in a livestock field day

I. Public Relations

1. Chapter sponsors an FFA awards and recognition program or similar activity

Examples:

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a. Invite guests - school personnel, members of agricultural organizations, local businessmen, newspaper editors, radio station manager, and community leaders

b. Allow FFA members to conduct a major part of the program

c. Present agricultural proficiency award medals; other chapter and area FFA awards

d. Program be conducted at no cost to guests or participants

e. Introduce parents and guests to the assembly

f. Award the honorary degree to deserving individuals

2. Chapter makes use of media in acquainting the public with the FFA organization

Examples:

a. Prepare a weekly news column concerning FFA activities and/or agricultural information

b. Release news stories periodically telling of achievements of the chapter or individual members

c. Schedule a regular radio or television program time with a local station

d. Send news stories to the state FFA publication

e. Prepare acticles for the school newspaper

f. Send articles and pictures to "The National Future Farmer" magazine and other national magazines

g. Present a public program to a school assembly, civic club, or other community organization

h. Prepare and display an educational exhibit

i. Sponsor outdoor billboard posters

j. Use materials bearing the emblem and letters of the FFA

k. Display FFA messages on marquees of local business

l. Put the letters "FFA" in lights on a hillside overlooking a highway

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   m. Provide "An FFA Member Lives Here" sign for each member

   n. Erect chapter roadside signs on appropriate highways

   o. Place an FFA trophy case in the school lobby

   p. Prepare and distribute a chapter newsletter

3. Chapter provides complimentary subscription to the national future farmer magazine

   Examples:

   a. Have chapter member personally deliver the first issue

   b. Provide subscriptions to honorary farmers, businessmen, and school personnel

4. Chapter conducts activities that acquaint the school faculty with the FFA

   Examples:

   a. Hold a faculty reception

   b. Invite faculty members to the FFA banquet

   c. Sponsor a school faculty luncheon or breakfast

   d. Invite faculty members to be judges of appropriate FFA contests

   e. Issue an individual invitation to each teacher to attend an FFA Open House

5. Chapter secures movie illustrating an FFA activity

   Examples:

   a. Secure films depicting group activities, e.g. BOAC, National FFA Convention

   b. Show films depicting individual accomplishments, e.g., "Four Star Farmers of America"

   (NOTE: The above films are available from The Venard Organization, Peoria, Illinois 61611.)

6. Chapter participates in the FFA calendar program

   Examples:

   a. Secure sponsors for calendar program

INFORMATION SHEET

  b. Purchase FFA calendars for distribution to parents, school personnel, and businessmen in the area

7. Chapter conducts major activities during national FFA week

   Examples:

   a. Hold a parent-member banquet

   b. Place a chapter display in a public place

   c. Sponsor a poster contest

   d. Declare a "jacket day" or "dress-up day" for members

   e. Raise "Greenhands" to the degree of "Chapter Farmer"

   f. Distribute FFA materials such as litter bags, safety warning stickers, etc.

   g. Attend church as a group

   h. Participate in a school assembly

   i. Give a demonstration of good parliamentary procedure

   j. Secure a section of a local newspaper for FFA news and information

   k. Present a radio and/or television program

   l. Arrange for mayor to issue a proclamation declaring National FFA Week for the area

   m. Invite a state or national FFA officer to visit the chapter

   n. Conduct a church service or other public program

   o. Conduct the chapter FFA public speaking contest before a community audience

   p. Provide FFA members as speakers for local organizations' meetings

   q. Purchase FFA Week materials from the National FFA Supply Service

   r. Use FFA Week "How To" idea booklet provided to each chapter prior to FFA Week

INFORMATION SHEET

8. Other suggested activities

   Examples:

   a. Prepare an "Easter Farm" or "Animal Farm" for the benefit of children

   b. Conduct a demonstration of good agricultural practices

   c. Organize a "Speakers' Bureau" of FFA members

   d. Participate in a parade

   e. Hold an oyster supper, barbecue, picnic, or similar activity

   f. Invite businessmen as speakers for a chapter meeting

   g. Sponsor a free "dairy luncheon" at school

   h. Conduct an FFA and Vo-Ag orientation program for eighth grade students

   i. Have chapter pay part of the cost of FFA jackets or loan members the money to make the purchase

   j. Use decals, stencils, and other materials bearing the FFA emblem and name

   k. Keep a scrapbook which is displayed at appropriate times

   l. Maintain an FFA bulletin board

   m. Honor outstanding boosters with appreciation certificates or the Honorary Chapter Farmer Degree

J. State and national activities

1. Chapter sends representatives to state and national conventions

   Examples:

   a. Select official local chapter delegates to attend state and national conventions

   b. Award travelships to convention participants to cover part or all of their expenses

   c. Organize transportation to conventions

   d. Arrange lodging and meals for chapter participants attending conventions

INFORMATION SHEET

   e. Send degree and award recipients to state and national conventions

   f. Members wear proper dress to conventions and other activities

2. Chapter has successful candidates for advanced FFA degrees

   Examples:

   a. Keep a current record of each member's FFA projects and activities

   b. Have committee of members and advisor review records of all members to see which members qualify for advanced degrees

   c. Organize a system to move all FFA members toward advanced degrees

   d. Review and approve completed applications for advanced degrees and submit to the state office

   e. Post photographs of advanced degree recipients in the agriculture classroom

3. Chapter has candidate(s) for an FFA office [illegible] the chapter level

   Examples:

   a. Acquaint potential candidates with opportunities for service

   b. Supply potential candidates with opportunities for personal leadership development

   c. Provide assistance to members in completing applications

   d. Review and approve completed applications and submit to state office

4. Submit applications above the local chapter level for awards sponsored by the National FFA Foundation, Inc.

   Examples:

   a. Provide members with information, applications, and assistance in filling out forms

   b. Obtain the present Foundation medals to worthy chapter members

INFORMATION SHEET

   c. Have members complete and submit completed Proficiency Award applications

   d. Complete and submit Building Our American Communities (BOAC) application

   e. Complete and submit Chapter Safety Award application

   f. Complete and submit National Chapter Award Program application

5. Chapter enters judging contests sponsored by the state or national organization

   Examples:

   a. Utilize judging contests in instructional program to involve all students

   b. Train members for judging events by working in the school and community

   c. Select members to represent the chapter in various contests above the chapter level

   d. Finance expenses for chapter judging teams participating above the chapter level

   e. Utilize FFA alumni members in training judging teams

6. Chapter participates in activities and/or programs to promote international understanding

   Examples:

   a. Invite foreign visitors to FFA chapter meetings and activities

   b. Conduct programs for foreign visitors at international assemblies

   c. Participate in National FFA Work Experience Abroad (WEA) Program

   d. Sponsor an orphan child in a foreign country

   e. Send materials to teachers, Peace Corps workers, missionaries, etc. in foreign countries

   f. Obtain slide presentation from National FFA Office on Work Experience Abroad program

INFORMATION SHEET

   g. Invite school foreign exchange student to chapter meeting for program

7. Chapter participation in other national FFA activities

   Examples:

   a. Participate at National Convention by serving in the National Band, National Chorus, Courtesy Corps, National Talent Contest, or serving as an usher or stage crew member

   b. Arrange for a chapter representative to attend a Summer Washington Conference Program

   c. Have member exchange programs between chapters in different states

   d. Select Chapter Sweetheart or girl member to participate in American Royal Queen's Contest and/or State Contest

   e. Have members donate to international child relief, CARE, UNICEF, and others

K. Alumni Relations

1. Improve community relations and support by involving formal and recent FFA members

   Examples:

   a. Hold joint meeting of FFA and FFA Alumni to keep them informed

   b. Chapter conduct activities to reinvolve former FFA members

   c. Conduct an activity to build FFA Alumni Association membership in the community

   d. Invite alumni to be chaperones for FFA activities

   e. Cooperate with Alumni Affiliate to construct a joint community agricultural display

   f. Recognize outstanding former members with "Alumnus of the Year" award.

2. Improving Educational Experiences

   a. Have Alumni plan and conduct educational tours and demonstrations

INFORMATION SHEET

   b. Use alumni member to serve on advisory council

   c. Involve alumni in preparing judging teams

   d. Involve Alumni as resource people for Vo-Ag instructors

   e. Use Alumni members as substitute teachers

   f. Inform Alumni of members who need job placement

3. Chapter cooperate with FFA Alumni affiliate to increase chapter participation, above local level and to encourage improved scholarship

   a. Have alumni affliate to sponsor chapter members to National Leadership Conference or Conventions

   b. Have alumni provide transportation to FFA function and activities

   c. Have alumni affiliate sponsor chapter judging contest

   d. Have alumni serve as "Big Brothers" for Greenhand

   e. Encourage Alumni Affiliate to provide awards for outstanding members

   f. Have Alumni provide scholarship for "Outstanding Senior"

   g. Involve Alumni in providing tours to college campuses and technical institutes and/or community colleges.

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

ASSIGNMENT SHEET #1--DEVELOP A FFA PROGRAM OF ACTIVITIES

Choose two of the major divisions and list the activities that you feel your chapter should participate in. Class members should choose different divisions whereby all divisions will be accounted for. Refer to the Superior Chapter report to make sure your chapter will meet the requirements for Superior Chapter.

Division________________

Committee Chairman___________________

Members:

1.
2.
3.
4.

Suggested Activities

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

ASSIGNMENT SHEET #1

Division________________

Committee Chairman______________________

Members:

1.
2.
3.
4.

Suggested Activities

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

TEST

1. Define the following terms:

   a. Program of activities--

   b. Executive committee--

   c. Sub-committee--

2. Select the benefits of having a well planned program of activities by placing an "X" by the correct statement.

   _____a. Include goals that serve as a means of directing the chapter activities in a positive manner

   _____b. Provide opportunity for members to use and develop skills taught in grade school

   _____c. Provide school administration and community with a better understanding of the local chapter

   _____d. Represent the thinking of a majority of the members but involves only junior and senior students

   _____e. Necessary for proper chapter recognition on the local, state, and national level

   _____f. Point out the vital part FFA has in a vocational agriculture department

3. Select the major divisions of the FFA Program of Activities by placing an "X" by the proper division.

   _____a. Cooperation

   _____b. Leadership

   _____c. Preventing loss of livestock

   _____d. Conduct of meetings

   _____e. Earnings, savings, and investments

   _____f. Special activities

   _____g. National FFA Week

   _____h. Community service

   _____i. Scholarship

   _____j. State contests

   _____k. Alumni Relations

4. List four parts of a program of activities.

   a.

   b.

   c.

   d.

5. Select the factors that contribute to a satisfactory program of activities by placing an "X" by the correct factors.

   _____a. All committee chairman realize it is their program and are involved

   _____b. Sufficient time given to evaluate, plan, and organize chapter activities

   _____c. Final program of activities are planned in May or whenever new officers are elected

   _____d. Resource personnel used in program planning and evaluation

   _____e. A well developed, realistic, and workable ways and means

   _____f. Review of the calendar of activities with the committee chairman and advisor

   _____g. Committee organization and membership cooperation

   _____h. Challenging and practical goals selected and based upon interest and needs of the state association

6. Select the steps to follow in constructing and conducting a satisfactory program of activities by placing an "X" by the proper steps.

   _____a. Have continuous and periodic evaluation of the chapter activities

   _____b. Have executive committee, under the guidance of the president appoint the program of activities committees

   _____c. Choose subcommittee members by their class rank and grade classification

   _____d. Encourage vice-president to meet with each committee to assist them in formulating their phase of the program of activities

   _____e. Secure copies of other chapter programs and get ideas on other suitable program ideas

   _____f. Instruct the president to keep informed on committee progress and to make regular reports _____g. Direct the reporter to record the chapter accomplishments on the program of activities wall chart or on a regular activity report form

7. Match the chapter activity on the left with the correct division on the right.

_____a. Provide shop project awards

_____b. Have veterinarian explain disease prevention and parasite control of livestock

_____c. Assist charitable organizations and campaigns

_____d. Hold at least one meeting each month at a regularly scheduled time

_____e. Establish a livestock breeding service cooperative

_____f. Provide members with experience in public speaking

_____g. Have representatives from a commercial bank speak on proper credit procedures

_____h. Present an award to the member with the best grade point average in agriculture

_____i. Take a summer trip to different areas of the state

_____j. Present Honorary Chapter farmer degree to local citizens

_____k. Select official local chapter delegates to attend State and National FFA Conventions

_____l. Chapter conduct activities to reinvolve former FFA members

1. Cooperation
2. Community service
3. Leadership
4. Earnings, savings and investments
5. Conduct of meeting
6. Supervised agriculture occupations experience
7. Recreation
8. Scholarship
9. FFA public relations
10. Participation in state and national activities
11. Alumni Relations

8. Develop a FFA program of activities

(NOTE: If this activity has not been accomplished prior to the test, ask your instructor when the above activity should be completed.)

DEVELOPING THE FFA PROGRAM OF ACTIVITIES
UNIT I

ANSWERS TO TEST

1. a. Outline of activities covering a definite period which includes specific goals, ways and means of reaching these goals, and provisions for checking on the accomplishments

   b. Committee made up of chapter officers and the chairman of each committee

   c. Members other than the chairman that make up a committee within the program of activities

2. a

   c

   e

   f

3. a

   b

   d

   e

   h

   i

4. Any four of the following:

   a. Division of the program of activities

   b. Activities to be participated in under the division

   c. Names of the committee members who will be responsible for each activity

   d. Goals to be accomplished under each activity

   e. Ways and means of reaching each goal

   f. Accomplishment information upon completion of each goal

5. b

d

e

g

6. a

d

e

g

7. a. 6

b. 6

c. 2

d. 5

e. 1

f. 3

g. 4

h. 8

i. 7

j. 9

k. 10

l. 11

8. Evaluated to the satisfaction of the instructor.

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

TERMINAL OBJECTIVES

After completion of Unit II, the student should be able to define young farmer and select objectives and activities for Young Farmers and Farm Wives. The student should be able to match awards and list programs available. This knowledge will be evidenced through completion of assignment sheets and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define Young Farmer
2. Select objectives of the Kansas Young Farmer Educational Association.
3. List 5 activities sponsored by the state association of Kansas Young Farmers and Farm Wives.
4. Name the types of membership of Kansas Young Farmers and Farm Wives.
5. List 5 successful suggested Kansas Young Farmer and Farm Wives community activities.
6. Name the state news publication for Kansas Young Farmers and Farm Wives.
7. Match the awards available for Kansas Young Farmers and Farm Wives.
8. List 4 program ideas for Kansas Young Farmers and Farm Wives.

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheets
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Give test

Students:

1. Read objectives
2. Study information sheets
3. Complete assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Assignment sheets
    - #1 - List Activities for a Young Farmer and Farm Wives Chapter
    - #2 - Identify Young Farmers in the Local Community
4. Test
5. Answers to test

References:

1. Leadership Manual for Kansas Young Farmer, Kansas State Department of Education, Kansas State Education Building, 120 E. 10th Street, Topeka, Kansas 66612.

2. Constitution Kansas Young Farmer Association.

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

INFORMATION SHEET

I. Young Farmers - Individuals that are interested in learning new techniques and methods of improving farming and have an active role in production agriculture.

II. Objectives of the Young Farmer Educational Association

A. To develop competent, aggressive, rural agricultural leadership.

B. To strengthen the confidence of young men in themselves and in their work

C. To encourage intelligent choices of farming enterprises.

D. To encourage members in the development of strong individual farming programs and establishment in farming.

E. To encourage each member to improve the farm home and its surroundings.

F. To participate in cooperative efforts.

G. To provide and encourage the development of organized rural recreational activities.

H. To assist in making decisions pertaining to farm management.

III. Activities of State Association of Kansas Young Farmers and Farm Wives

A. Annual State Convention held in February.

B. Annual State tour held in July or August.

C. Publish and mail the "News and Views" to each member quarterly.

D. Secure sponsors for the awards program.

E. Send two delegates to the annual National Young Farmer Institute.

F. Publish an annual directory of Young Farmer members.

G. Exhibit a booth annually at the Kansas State Fair, Hutchinson.

(NOTE: Individual Benefits for people interested in Young Farmers in general are opportunity to increase gross and net worth, new techniques, State and National activities, new ideas.)

INFORMATION SHEET

H. Provide State Young Farmer educational promotional material for local chapters and members.

I. Conduct district leadership programs for chapter officers.

IV. Types of membership for Kansas Young Farmers and Farm Wives.

A. Active Membership - Any person regularly enrolled in a young farmer class is eligible to become an active member of the local organization.
(NOTE: Member over thirty-five years of age are not eligible to hold state office or receive a state award.)

B. Associate Membership - An active member upon reaching the age of 36 years may become an associate member.

C. Honorary Membership - Any person who has made an outstanding contribution to the Kansas Young Farmers Association or to the general improvement of agriculture may be elected to honorary membership.

V. Successful Suggestions for Young Farmer and Young Farm Wives Community Activities.

A. Young Farmer

1. Sponsor an annual family picnic.

2. Sponsor a gilt ring for the local FFA Chapter.

3. Sponsor a scholarship for the local Vocational Agriculture department.

4. Sponsor a Spring Barrow Show.

5. Sponsor an appreciation dinner for Agribusinessmen for sponsorship of Tractor Pull.

B. Young Farm Wives

1. Start year's activities with joint basket dinner

2. Conduct community fund drive.

3. Prepare the meal for Wild Game Feed for FFA members.

4. Donate to a new community building.

5. Make contribution to Summer baseball program for Youth.

VI. "News and Views" - State News

A. Four issues are printed each year.

B. Sponsored by advertisement from companies interested in supporting the organization.

C. Issues Contain

1. News items and pictures of interest to members
2. Letters from state president and news of Chapter activities from local reporters.

D. Publication is edited by the Executive Secretary of the Kansas Young Farmer Educational Association.

VII. A. Kansas State Young Farm Family- First Award $300 and plaque; second award $200 and plaque; third award $100 and plaque.

B. District Star Young Farm Family- (Western, Central, and Eastern district) First Award (each district) $75 and plaque; second award (each district) $50 and plaque; third award (each district) $25 and plaque

C. Community Service- First Award $100 and plaque; second award $50 and plaque

D. Star Young Farmer Advisor- First Award $50 and plaque; second award $25 and plaque

E. Honorary Membership

F. Distinguished Service

G. Local Awards- Encouraged to present awards, to outstanding local members and/or Agribusinessmen who support the local program

VIII. Program Ideas for Kansas Young Farmer and Farm Wives

A. Kansas Young Farmers

1. Crop Production
2. Livestock
3. Farm Mechanics
4. Farm Business Management
5. Tours

(NOTE: Select items under each broad topic for meeting.)

B. Young Farm Wives

1. Family Relations and Child Development
2. Foods and Nutritions
3. Clothing and Textiles
4. Family Economics
5. Consumer Education

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

ASSIGNMENT SHEET #1

LIST ACTIVITIES FOR A YOUNG FARMER AND FARM WIVES CHAPTER

List activities and programs in which a Young Farmer or Farm Wives in your community should participate.

1. Educational Activities.

2. Community Service Activities.

3. Recreational Activities.

4. Leadership Activities.

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

ASSIGNMENT SHEET #2

IDENTIFY YOUNG FARMERS AND FARM WIVES IN THE LOCAL COMMUNITY

List the Young Farmers and/or Farm Wives in your local community that would benefit from a Young Farmer and Farm Wives Chapter.

KANSAS YOUNG FARMER AND FARM WIVES
UNIT II

TEST

1. Define Young Farmer -

2. Select from the list below the objectives of the Young Farmer Educational Association. Place an "X" by the correct answer.

    _____a. To develop competent, aggressive, rural Agricultural leadership

    _____b. Sponsor a Gilt Ring for the local FFA chapter

    _____c. To encourage intelligent choices of farming enterprises

    _____d. To participate in cooperative efforts.

    _____e. Conduct a variety test plot for corn, milo, or soybeans.

    _____f. To assist in making decisions pertaining to farm management.

3. List five of the activities sponsored by the State Association of the Kansas Young Farmers and Farm Wives.

    a.

    b.

    c.

    d.

    e.

4. Name the three (3) types of membership for the Kansas Young Farmers and Farm Wives.

    a.

    b.

    c.

5. List five (5) successful suggestions for Young Farmers and Farm Wives, community activities.

    a.

    b.

    c.

    d.

    e.

6. _______________and__________________ is the State News publication.

7. Match the awards available for the Kansas Young Farmers and Wives, with their proper description.

_____a. Kansas Star Young Farm Family

_____b. District Star Young Farm Family

_____c. Community Service

_____d. Star Young Farmer Advisor

1. First award $100, and plaque; second award $50 and plaque.

2. First award $300 and plaque; second award $200 and plaque.

3. (Western, Central & Eastern district) First award (each district) $75 and plaque; second award (each district) $50 and plaque; third award (each district) $25 and plaque

4. First award $50 and plaque; second award $25 and plaque.

8. List four (4) program ideas for Kansas Young Farmers and Farm Wives.

a.

b.

c.

d.

KANSAS YOUNG FARMERS AND FARM WIVES
UNIT II

ANSWERS TO TEST

1. Define:

   Young Farmers: Individuals that are interested in learning new techniques and methods of improving farming and have an active role in production agriculture.

2. a. __X__
   b. _____
   c. __X__
   d. __X__
   e. _____
   f. __X__

3. Any five of the following:

   a. Annual State Convention held in February.
   b. Annual State Tour held in July or August.
   c. Publish and mail the "News and Views" to each member quarterly.
   d. Secure sponsors for the awards program.
   e. Send two delegates to the annual (National) Young Farmer Institute
   f. Publish an annual directory of Young Farmer Members.
   g. Exhibit a booth annually at the Kansas State Fair, Hutchinson.
   h. Provide State Young Farmer Educational promotional material for local
   i. Conduct district Leadership Programs for chapter officers.

4. a. Active
   b. Associate
   c. Honorary

5. a. Young Farmer (any of the following)

   1. Sponsor an annual family picnic.
   2. Sponsor a gilt ring for local FFA Chapter.
   3. Sponsor a scholarship for the local Vocational Agriculture Depart.
   4. Sponsor a Spring Barrow Show
   5. Sponsor an appreciation dinner for Agribusiness for sponsoring of tractor pull.

   b. Young Farm Wives
   1. Start year's activities with joint basket dinner.
   2. Conduct community fund drive.
   3. Prepare the meal for Wild Game Feed for FFA members.
   4. Donate to new community building.
   5. Make contributions to summer baseball program for youth.

6. NEWS and VIEWS

7. 2 a.
   3 b.
   1 c.
   4 d.

8. Any Four (4) of the following:

   a. Crop Production
   b. Livestock
   c. Farm Mechanics
   d. Farm Business Management
   e. Tours
   f. Fire Prevention
   g. Toys for children
   h. Juvenile delinquency and foster homes
   i. Gardening tips
   j. Outdoor cooking
   k. Farm Record Keeping

SELECTING A CAREER
UNIT III

TERMINAL OBJECTIVES

After the completion of Unit III, the student should be able to match terms and definitions associated with career selection, select the advantages of selecting a career, and list the important points in choosing a career. The student should be able to select a career and obtain information pertaining to this career. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms and definitions associated with careers.
2. Select from a list the advantages of selecting a career.
3. List the important points in choosing a career.
4. Select a career and obtain information pertaining to the selected career.

SELECTING A CAREER
UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparency
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet and turn in to instructor
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency master
    TM 1--Personal-Social Qualities
4. Assignment Sheet
    #1--Information Pertaining to a Career
5. Test
6. Answers to test

References:

1. Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: Interstate Publishers and Printers, 1969.

2. Career Exploration, A Guide for Teachers. Oklahoma City, Oklahoma: State Department of Education, 1970.

SELECTING A CAREER
UNIT III

INFORMATION SHEET

I. Terms and definitions

A. Agricultural industry--The industry covering broad areas of agriculture from production, through supplying and servicing, business, finance, and all the necessary functions of making agricultural commodities available to the consumer

B. Agri-business--A term referring to the inputs of producing food and fiber, including processing and marketing

C. Career--A course of continued progress in the life work of a person or progress through life in a series of related occupations or activities

D. Career pattern--The sequence of occupations in the life of an individual that makes up a career

E. Occupation--A group of related jobs in an area of work which constitutes the work a person does regularly to make a living

F. Occupational choice--A process one goes through eliminating some occupations and retaining others until an occupation has been chosen

G. Job--A piece of work which is rather specific and definite in nature

H. Career education--The preparation of a student for a successful life of work by increasing his options for occupational choice, by eliminating barriers, real and imagined, to attaining job skills, and by enhancing learning achievement in all subject areas and at all levels of education

I. Agricultural professions--Specialized careers that require a college degree for entry

Examples: Foresters, teachers of agriculture, county agricultural agents, venterinarians, agricultural engineers, and soil conservationists

II. Advantages of selecting a career

A. Greater degree of happiness and satisfaction

B. More opportunities for promotion and advancement

C. Financial and fringe benefits are greater

D. Greater selection of people to work with

INFORMATION SHEET

III. Important points in choosing a career

- A. Type of work or job description
- B. Essential personal-social qualities (Transparency 1)

  (NOTE: This may include the qualities listed below.)

  1. Pleasing personal appearance
     - a. Grooming
     - b. Poise
     - c. Voice
     - d. Posture
  2. Enthusiasm
  3. Honesty and dependability
  4. Initiative and ambition
  5. Friendliness
  6. Cooperation and courtesy
  7. Punctuality
  8. Self-confidence and control
  9. Business like behavior
- C. Educational-training requirements
  1. High school
  2. Post high school--Two year technical school or four year baccalaureate program
- D. Finances needed to enter and complete training
- E. Entry level jobs
- F. Advancement possibilities
- G. Licensing or certification
- H. Working conditions

INFORMATION SHEET

I. Health and physical requirements

J. Earnings and benefits

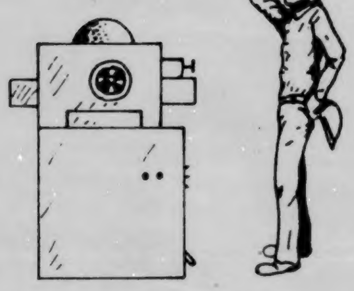
K. Outlook--Probable demand for workers, etc.

Personal-Social Qualities

Of 10 Workers Who Lose Their Jobs

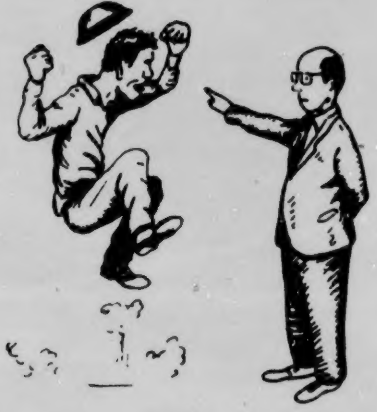
1

Lacks Technical Skill



9

Do Not Know How to Get Along with People



TM 1

Ag. IV - 75-B

SELECTING A CAREER
UNIT III

ASSIGNMENT SHEET #1--INFORMATION PERTAINING TO A CAREER

Obtain the following information from a prospective employer or a person working in the same career.

1. Career selected

2. Job title

3. Exactly what does the worker do?

4. What tools or equipment does he use?

5. Does job require: High school education?______College?______

   Technical school?________Other?_______

6. What qualifications, other than educational, are necessary?

   Physical

   Mental

   Aptitude or personality

7. What are the working conditions and hours?

8. In what kind of business is this job found?

9. What are the opportunities for advancement?

10. List as many related jobs as you can.

11. What interests of yours would this job satisfy?

12. What abilities of yours is this job related to?

ASSIGNMENT SHEET #1

13. Will this job require more or less employees in the future?

14. What equipment will I be required to purchase?

15. Upon what basis are employees evaluated for promotion.

16. What are the most common mistakes made by employees in performing this job.

17. What are the expected earnings and benefits from the job.

SELECTING A CAREER
UNIT III

TEST

1. Match the terms on the right to the proper definition.

_____a. A piece of work which is rather specific and definite in nature

_____b. The sequence of occupations in the life of an individual that makes up a career

_____c. A term referring to the inputs of producting food and fiber, including processing and marketing

_____d. A group of related jobs in an area of work which constitutes the work a person does regularly to make a living

_____e. Specialized careers that require a college degree for entry

_____f. The preparation of a student for a successful life of work by increasing his options for occupational choice, by eliminating barriers, real and imagined, to attaining job skills, and by enhancing learning achievement in all subject areas and at all levels of education

_____g. The industry covering broad areas of agriculture from production, through supplying and servicing, business, finance, and all the necessary functions of making agricultural commodities available to the consumer

_____h. A course of continued progress in the life work of a person or progress through life in a series of related occupations or activities

_____i. A process one goes through eliminating some occupations and retaining others until an occupation has been chosen

1. Agricultural industry
2. Agri-business
3. Career
4 Career pattern
5. Occupation
6. Occupational choice
7. Job
8. Career education
9. Agricultural professions

2. Select from the list below the advantages of selecting a career. Place an "X" by the correct answers.

   _____a. Greater degree of happiness and satisfaction

   _____b. More opportunities for promotion and advancement

   _____c. Shorter working hours with less fringe benefits

   _____d. Greater selection of people to work with

3. Name seven points one should consider when choosing a career.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

4. Select a career and obtain information pertaining to the selected career.

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when it should be completed.)

SELECTING A CAREER
UNIT III

ANSWERS TO TEST

1. a. 7
   b. 4
   c. 2
   d. 5
   e. 9
   f. 8
   g. 1
   h. 3
   i. 6

2. a
   b
   d

3. Any seven of the following:
   a. Type of work or job description
   b. Essential person-social qualities
   c. Educational-training requirements:
      1) High school
      2) Post high school--Two year technical school or four year baccalaureate program
   d. Finances needed to enter and complete training
   e. Entry level jobs
   f. Advancement possibilities
   g. Licensing or certification
   h. Working conditions
   i. Health and physical requirements

   j. Earnings and benefits
   k. Outlook--Probable demand for workers

4. Evaluated to the satisfaction of the instructor.

LAND JUDGING
UNIT I

TERMINAL OBJECTIVES

After completion of Unit I, the student should be able to judge land, recommend land treatments and complete the score card. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with land judging to the correct definition.
2. Name the reasons for judging land.
3. Name the six factors used in determining the land capability class.
4. Match the different variations of permeability, depth, slope, erosion, and surface runoff with the identifying characteristics of each.
5. Name the three major groups of soil in relation to texture.
6. Discuss in a short paragraph the means of determining soil texture by touch.
7. Match the land capability classes with the proper definition.
8. Classify the eight land capability classes according to their proper usage.
9. Select, when given six land factors, the best land class possible for the specified field.
10. Select the recommended land treatments when given the land capability class.
11. Name the proper fertilizer and soil amendments when given the deficiency.
12. List two combination land factors which lowers the land capability class.
13. Demonstrate the ability:
    a. Complete a land judging score card when given the characteristics of a field.
    b. Judge a field and complete the score card.

LAND JUDGING
UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Conduct field trip to judge a previously prepared land site
7. Give test

Student:

1. Read objective sheet
2. Study information sheet
3. Complete assignment sheets
4. Participate in field trip
5. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
   TM 1--Soil Profile
   TM 2--Textural Groups and Soil Textures
4. Assignment sheets
   #1--Selecting Proper Fertilizer and Soil
   #2--Completing Land Judging Score Card
5. Answers to assignment sheets
6. Test
7. Answers to test

References:

1. Instructions in Land Judging and Homesite Evaluation; Cooperative Extension Service, Kansas State University, Manhattan, Kans. 66502.

LAND JUDGING
UNIT I

INFORMATION SHEET

I. Terms and definitions

A. Surface texture--Proportion of sand, silt, and clay in a soil mass

B. Soil consistency--Way that soil particles hold together or resist being broken apart

C. Soil structure--Way that individual soil particles are grouped together to form clusters of particles

D. Topsoil--Soil directly under our feet; "A" horizon zone in which seeds are planted and cultivated (Transparency 1)

E. Subsoil--Layer found just below the topsoil; this layer is the "B" horizon and the storehouse for moisture and minerals

F. Substratum--Area immediately below the subsoil; this is "C" horizon

G. Permeability--Ease with which air and water go down into the soil and return back toward the surface

H. Erosion--Amount of soil that has been removed

(NOTE: Erosion occurs either by wind or by water.)

I. Surface runoff--Relative rate water is removed by flow over the soil surface

J. Soil depth--Total thickness of topsoil and subsoil down to parent material

K. Slope--Number of feet fall in each 100 feet

(NOTE: This is determined by dividing feet traveled into rise or fall.)

L. Capability class--Classification of land according to its productive capacity and conservation treatment required to check erosion

M. Inhibitory factors--Conditions which hinder land and limit its capability

Examples: Stoniness, wetness, gravelly, salt accumulations, and flooding

N. Soil conserving crops--Crops that prevent or retard erosion and tend to maintain rather than deplete soil organic matter

INFORMATION SHEET

(NOTE: Close seeded crops are generally regarded as soil conserving crops.)

O. Soil improving crops--Improve or replenish rather than deplete soil organic matter; improve soil structure and tilth

P. Lime--Calcareous ingredient that neutralizes acidity and supplies calcium to the soil

II. Reasons for judging land

A. Aids in the understanding and importance of basic soil differences as they affect crop production and erosion

B. Helps one to determine management practices important to proper use of soil and water

C. Develops understanding of different soil and water conservation practices

D. Aids in understanding the influence of land features on production and land protection

E. Aids in selecting a farm for purchase

III. Factors determining land capability class

A. Surface texture

B. Permeability

C. Depth of soil

D. Slope

E. Erosion

(NOTE: This includes wind and water.)

F. Surface runoff

IV. Land factor variations

A. Degrees of permeability

1. Rapid--Soils that have sandy subsoils

2. Moderate--Soils that have highly granular, clay loam subsoil

3. Slow--Soils that have crumbly, clayey subsoil

4. Very slow--Soils that have dense, heavy clay or clay pan subsoils

INFORMATION SHEET

B. Soil depths

1. Deep--More than 36 inches deep
2. Moderately deep--Twenty to 36 inches deep
3. Shallow--Ten to 20 inches deep
4. Very shallow--Less than 10 inches deep

C. Degrees of slope

1. Nearly level--Less than 1 foot fall in each 100 feet
2. Gently sloping--One to 3 feet fall in each 100 feet
3. Moderately sloping--Three to 5 feet fall in each 100 feet
4. Strongly sloping--Five to 8 feet fall in each 100 feet
5. Steep--Eight to 12 feet fall in each 100 feet
6. Very steep--More than 12 feet fall in each 100 feet

D. Degrees of erosion

1. None to slight--Less than 25 percent surface soil removed with no gullies
2. Moderate--Twenty-five to 75 percent of surface soil removed with or without crossable gullies
3. Severe--Seventy five percent or more of the surface soil removed or with occasional uncrossable gullies (gullies more than 100' apart) and/or severe accumulation by wind

   (NOTE: An uncrossable gully is that which cannot be crossed or is very difficult to cross with farm equipment.)

4. Very severe--Seventy-five percent or more of surface soil removed or with frequent uncrossable gullies (gullies less than 100' apart) and/or severe accumulation by wind

E. Variance in surface runoff

1. Rapid--Surface water flows rapidly; fields with slopes of 3 percent and above (except rapid permeability soils) would go in this category
2. Moderate--Normal runoff from soils and slopes of 1 to 3 percent; rapidly permeable soils excepted

INFORMATION SHEET

3. Slow--Surface water flows away slowly; surplus water on clayey soils is an occasional problem

4. Very slow--Surface water flows away very slowly; soils may remain wet for long periods of time

V. Major groups of soil in relation to texture (Transparency 2)

A. Sandy soil--Includes coarse textured, very sandy soils

B. Loamy soil--Includes moderately coarse, medium textured, and moderately fine textured soils

C. Clayey soil--Includes fine-textured soils

VI. Determining soil texture by touch

A. Sandy soils--When rubbed between the fingers this soil has a rough, gritty feeling (no ribbon)

B. Loamy soil--When rubbed between the fingers this soil has a touch of velvet or the feel of wheat flour (1" - 3" ribbon)

C. Clayey soils--When rubbed between the fingers this soil feels sticky (2" - 4" ribbon)

(NOTE: Soil texture by touch is easier to determine when soil is moist.)

VII. Land capability classes

A. Class I--Soils having few limitations that restrict their use; overhead water does not change the land class--treatment is usually on adjacent soils

B. Class II--Soils having some limitations that reduce the choice of plants or require moderate conservation practices

C. Class III--Soils having severe limitations that reduce the choice of plants or require special conservation practices or both

D. Class IV--Soils having very severe limitations that restrict the choice of plants, require very careful management, special conservation or both

E. Class V--Soils having little or no erosion hazards, but having other limitations that are impractical to remove that limits their use largely to pasture, range, woodland or wildlife food and cover; these include very poor drainage with wet poorly drained profiles or frequently flood areas

F. Class VI—Soils having severe limitatiions that make them generally unsuited for cultivation and limits their use largely to pasture or range, woodland, or wildlife food and cover

INFORMATION SHEET

G. Class VII--Soils having very severe limitations that make them unsuited for cultivation and restricts their use largely to grazing, woodland, or wildlife

H. Class VIII--Soils and land forms having limitations that preclude their use for commercial plant production and restrict their use to wildlife, recreation, water supply or scenic purposes

VIII. Suitable uses for capability classes

A. Classes I, II, III, IV--Suited for cultivation and other uses such as grazing, forestry, or wildlife food and cover

B. Classes V, VI, VII--Land not suited for cultivation; suited for grazing, forestry, or wildlife food and cover

C. Class VIII--Land not suited for cultivation, grazing, or forestry; used for wildlife, recreation, water supply, or scenic purposes

IX. General guide for selecting land capability classes

Soil Factor	Best Land Class Possible
A. Texture	
1. Sandy soils	III
2. Loamy soils	I
3. Clayey soils	I
B. Depth	
1. Deep or moderately deep	I
2. Shallow	III
3. Very shallow	VII
C. Permeability	
1. Rapid	III
2. Moderate	I
3. Slow	I
4. Very slow	II

INFORMATION SHEET

D. Slope

1. Nearly level	0--1%	I
2. Gently sloping	1%--3%	II
3. Moderately sloping	3%--5%	III
4. Strongly sloping	5%--8%	IV
5. Steep	8%--12%	VI
6. Very steep	12%--(and over)	VI

E. Erosion

1. None to slight erosion	I
2. Moderate	II
3. Severe or very severe	VI

F. Runoff (Surface)

1. Rapid	III
2. Moderate	I
3. Slow	I
4. Very slow	II

X. Recommended land treatments

- A. Vegetative practices normally used
    - 1. Use soil conserving and/or soil improving crops
        - a. Every fourth or fifth year--Applies to Class I
        - b. Every third or fourth year--Applies to Class II
        - c. Every second year--Applies to Class III
        - d. Every year--Applies to Class IV
    - 2. Do not burn crop residue--Applies to Classes I, II, III, IV
    - 3. Use residue management and/or minimum tillage--Applies to Class I, II, III, IV

INFORMATION SHEET

4. Establish recommended grass or grass and legumes--Applies to Class V, VI, VII
5. Use proper pasture and range management--Applies to Class V, VI, VII
6. Protect land from burning--Applies to Classes V, VI, VII, VIII
7. Use control grazing--Applies to Classes V, VI, VII
8. Plant recommended trees--Applies to land needing a windbreak or whenever operator desires to go into timber production or post lot production
9. Harvest trees selectively--Applies to land operator who desires to go into timber production or who desires post lot or wood lot
10. Use land only for wildlife or recreation area--Applies to Class VIII

B. Mechanical land treatments that may be used

1. Control brush or trees--This sometimes is used in all capability classes with the exception of Class VIII
2. Terrace and farm on contour--May apply to Classes II, III, and IV depending on soil, slope, cover, erosion and intensive use
3. Maintain terraces--This practice should be used anytime terracing and farming on contour is recommended
4. Construct diversion terraces--This practice should be used whenever field has overhead water problem
5. Install drainage system--Used where wetness is a factor
6. Control gullies--This practice should be used when gullies are a problem (either crossable or uncrossable)
7. A field can be found that would need no mechanical treatment--This could apply to Classes I, II, III, IV, V, VI, and VII

C. Fertilizer and soil amendments that might be applied

1. Lime--Necessary when soil test reveals acid condition
2. Phosphate (P)--Necessary when soil test reveals deficiency in phosphorus
3. Potash (K)--Necessary when soil test reveals deficiency in potassium

INFORMATION SHEET

4. Nigrogen (N)--Necessary when soil test reveals deficiency in nitrogen

5. Nitrogen, phosphate, and potash--Necessary when soil test reveals deficiency in nitrogen, phosphorus, and potassium

6. Fertilizer or soil amendments not needed--neither line, N, P, nor K are low enough to merit application.

XI. Land Judging Combinations

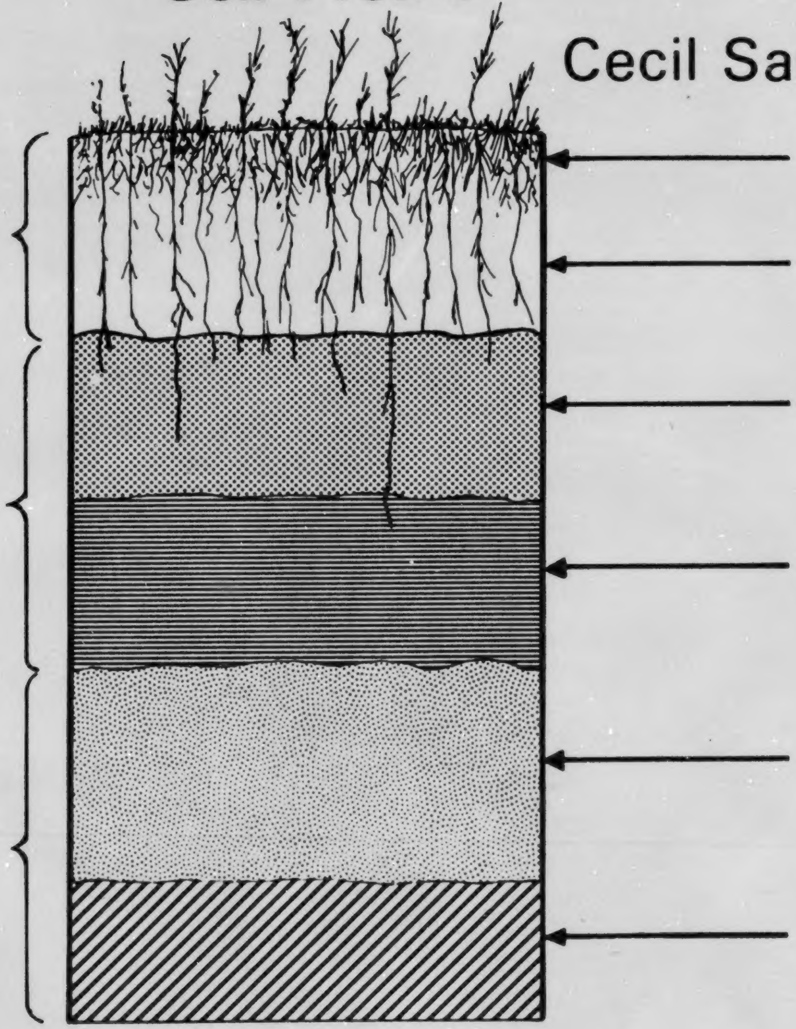
A. In many cases a field will have a combination of factors which will lower its land capability class.

B. Examples — Combination Land Capability Class

1. Sandy Soils (3) and Moderate Slope (3) - - - 4
2. Very Slow Permeability (2) and Very Slow Runoff (2) - - - 3
3. Very Slow Permeability (2) and Gently Sloping (2) - - - 3
4. Very Slow Permeability (2) and Moderate Slope (3) - - - 4
5. Very Slow Permeability (2) and Strongly Slope (4) - - - 6
6. Gently Sloping (2) and Moderate Erosion (2) - - -3
7. Strongly Sloping (4) and Shallow Depth (3) - - - 6
8. Very Severe Erosion (6) and Shallow Depth (3) - - - 7
9. Very Severe Erosion (6) and Steep Slope (6) - - - 7
10. Very Severe Erosion (6) and Very Steep Slope (6) - - - 7

Soil Profile

Cecil Sandy Loam



TOPSOIL
(A Horizon)
Sandy Loam

SUBSOIL
(B Horizon)
Clay

SUBSTRATUM
(C Horizon)
Rock

Humus

Less Humus

Friable Clay

Stiff Clay

Soft Rock

Solid Rock

Textural Groups and Soil Textures

Sandy Soils	Coarse Textured Very Sandy Soils	Sands Loamy Sands
Loamy Soils	Moderately Coarse Textured Soils	Sandy Loam Fine Sandy Loam
	Medium-Textured Soils	Very Fine Sandy Loam Loam Silt Loam Silt
	Moderately Fine Textured Soils	Clay Loam Sandy Clay Loam Silty Clay Loam
Clayey Soils	Fine-Textured Soils	Sandy Clay Silty Clay Clay

LAND JUDGING
UNIT I

ASSIGNMENT SHEET #1--SELECTING PROPER FERTILIZER AND SOIL AMENDMENTS

Select the proper amendments for the following deficiencies.

1. ______Soil deficient in phosphorus
2. ______Soil deficient in potassium
3. ______Soil deficient in nitrogen and potash
4. ______Soil deficient in N, P, and K
5. ______Soil deficient in N
6. ______Soil is acid

a. Lime
b. Phosphate
c. Potash
d. Nitrogen
e. Nitrogen, phosphate, and potash

LAND JUDGING
UNIT I

ASSIGNMENT SHEET #2--COMPLETING LAND JUDGING SCORE CARD

Apply the following land class factors and field conditions to the judging score card.

1. Texture--Feel of wheat flour
2. Permeability--Granular, clay loam
3. Depth--Twenty-six inches
4. Slope--Three and one-half feet fall in each 100 feet
5. Erosion--Thirty percent of top soil removed, no gullies
6. Surface drainage--Excessive runoff
7. Soil tests--Show deficiencies in nitrogen

ASSIGNMENT SHEET #2

LAND JUDGING SCORE CARD

LJ-1

(Indicate your answer by an X in the square with number.)

Contestant No.____________________

Field No.__________________

Name____

Address______________________________________

County or Chapter______________________________

Organization__________________________________

PART I—LAND CLASS FACTORS

SCORE

A. SURFACE TEXTURE
- ☐ 1. Sandy soils
- ☐ 2. Loamy soils
- ☐ 3. Clayey soils

B. PERMEABILITY
- ☐ 1. Rapid
- ☐ 2. Moderate
- ☐ 3. Slow
- ☐ 4. Very slow

C. DEPTH OF SOIL
- ☐ 1. Deep
- ☐ 2. Moderately deep
- ☐ 3. Shallow
- ☐ 4. Very shallow

D. SLOPE
- ☐ 1. Nearly level
- ☐ 2. Gently sloping
- ☐ 3. Moderately sloping
- ☐ 4. Strongly sloping
- ☐ 5. Steep
- ☐ 6. Very steep

E. EROSION—WIND & WATER
- ☐ 1. None to slight
- ☐ 2. Moderate
- ☐ 3. Severe
- ☐ 4. Very severe

F. SURFACE RUNOFF
- ☐ 1. Rapid
- ☐ 2. Moderate
- ☐ 3. Slow
- ☐ 4. Very slow

G. MAJOR FACTORS — That keep area out of Class I:
- ☐ 1. Texture
- ☐ 2. Permeability
- ☐ 3. Depth
- ☐ 4. Slope
- ☐ 5. Erosion
- ☐ 6. Runoff
- ☐ 7. Wetness
- ☐ 8. Flooding
- ☐ 9. None

H. LAND CAPABILITY CLASS
- ☐ 1. Class I
- ☐ 2. Class II
- ☐ 3. Class III
- ☐ 4. Class IV
- ☐ 5. Class V
- ☐ 6. Class VI
- ☐ 7. Class VII
- ☐ 8. Class VIII

PART II—RECOMMENDED LAND TREATMENTS—Needed for land capability classes

SCORE

VEGETATIVE

Use soil conserving and/or soil improving crops:
- ☐ 1. Every 4th or 5th year.
- ☐ 2. Every 3rd or 4th year.
- ☐ 3. Every 2nd year.
- ☐ 4. Every year.

- ☐ 5. Do not burn crop residue.
- ☐ 6. Residue management and/or minimum tillage.
- ☐ 7. Establish recommended grass or grasses or legumes.
- ☐ 8. Proper pasture and range management.
- ☐ 9. Protect from burning.
- ☐ 10. Control grazing.
- ☐ 11. Plant recommended trees.
- ☐ 12. Harvest trees selectively.
- ☐ 13. Use only for wildlife or recreation area.

MECHANICAL
- ☐ 14. Control brush or trees.
- ☐ 15. Terrace and farm on contour.
- ☐ 16. Maintain terraces.
- ☐ 17. Construct diversion terraces.
- ☐ 18. Install drainage system.
- ☐ 19. Control gullies.
- ☐ 20. No mechanical treatment needed.

FERTILIZER & SOIL AMENDMENTS
- ☐ 21. Lime
- ☐ 22. Phosphate (P)
- ☐ 23. Potash (K)
- ☐ 24. Nitrogen (N)
- ☐ 25. Nitrogen, Phosphate and Potash (NPK)
- ☐ 26. Fertilizer or soil amendments not needed.

________ SCORE PART I (Possible 40)

________ SCORE PART II (Possible 30)

TOTAL SCORE (Possible 70) ________

Cooperative Extension Service, Kansas State University, Manhattan, Kansas

7-75—15M

LAND JUDGING
UNIT I

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. b
2. c
3. c and d
4. e
5. d
6. a

Assignment Sheet #2

Part I	Part II
A. 2	3, 5, 6, 15, 16, 24
B. 2	
C. 2	
D. 3	
E. 2	
F. 1	
G. 4, 5, 6	
H. 3	

LAND JUDGING
UNIT I

TEST

1. Match the terms on the left with the definition on the right.

______ a. Erosion
______ b. Substratum
______ c. Permeability
______ d. Subsoil
______ e. Topsoil
______ f. Soil consistency
______ g. Surface texture
______ h. Soil structure
______ i. Surface runoff
______ j. Soil depth
______ k. Lime
______ l. Slope
______ m. Capability class
______ n. Soil conserving crops
______ o. Soil improving crops
______ p. Inhibitory factors

1. Relative rate water is removed by flow over the soil surface
2. Total thickness of topsoil and subsoil down to parent material
3. Crops that prevent or retard erosion and tend to maintain rather than deplete soil organic matter
4. Conditions that hinder land and limit its capbility
5. Number of feet fall in each 100 feet
6. Classification of land according to its productive capacity and conservation treatment required to check erosion
7. Improve or replenish rather than deplete soil organic matter; improve soil structure and tilth
8. Ease with which air and water go down into the soil and return toward the surface
9. Soil directly under our feet; "A" horizon zone in which seeds are planted and cultivated
10. Layer found just below the topsoil; this layer is the "B" horizon and the storehouse for moisture and minerals
11. Amount of soil that has been removed
12. Area immediately below the subsoil; this is "C" horizon

13. Way that individual soil particles are grouped together to form clusters of particles

14. Way that soil particles hold together or resist being broken apart

15. Proportion of sand, silt, and clay in a soil mass

16. Calcareous ingredient that neutralizes acidity and supplies calcium to the soil

2. Name three reasons for judging land.

   a.

   b.

   c.

3. Name the six factors used in determining the land capability class.

   a.

   b.

   c.

   d.

   e.

   f.

4. Match the terms on the left with the statements on the right indicating slope, erosion, permeability, and soil depth.

   a. Slope

      1) _____Gently sloping
      2) _____Nearly level
      3) _____Steep
      4) _____Moderately sloping
      5) _____Very steep
      6) _____Strongly sloping

      a) Three to 5 feet fall in each 100 feet
      b) More than 12 feet fall in each 100 feet
      c) Eight to 12 feet fall in each 100 feet
      d) Five to 8 feet fall in each 100 feet

e) Less than 1 foot fall in each 100 feet

f) One on 3 feet fall in each 100 feet

b. Erosion

1) _____Severe

2) _____None to slight

3) _____Moderate

4) _____Very severe

a) Less than 25 percent surface soil removed with no gullies

b) Seventy-five percent or more of the surface soil removed or with occasional uncrossable gullies and/or severe accumulation by wind

c) Seventy-five percent or more of surface soil removed or with frequent uncrossable gullies and/or severe accumulation by wind

d) Twenty-five to 75 percent of surface soil removed with or without gullies

c. Surface runoff

1) _____Rapid

2) _____Moderate

3) _____Slow

4) _____Very slow

a) Normal runoff from soils with slopes of 1 to 3 percent; rapidly permeable soils excepted

b) Surface water flows rapidly; fields with slopes of 3 percent and above (except rapid permeability soils) would go in this catagory

c) Surface water flows away slowly; surplus water on clayey soils is an occasional problem

d) Surface water flows away very slowly; soils may remain wet for long periods of time

d. Permeability

1) _____Slow

2) _____Rapid

3) _____Very slow

4) _____Moderate

a) Soils that have sandy subsoils

b) Soils that have highly granular, clay loam subsoils

c) Soils that have dense, heavy clay or clay pan subsoils

d) Soils that have crumbly, clayey subsoils

e. Depth

1) _____Shallow

2) _____Deep

3) _____Very shallow

4) _____Moderately deep

a) Less than 10 inches deep

b) Twenty to 36 inches deep

c) Ten to 20 inches deep

d) More than 36 inches deep

5. Name the major groups of soil in relation to texture

a. ____________includes moderately coarse, medium textured, and moderately fine textured soils

b. ____________includes fine-textured soils

c. ____________includes coarse textured, very sandy soils

6. Describe the feeling when the following soils are rubbed by the finger

a. Loamy soils--

b. Clayey soils--

c. Sandy soils--

7. Match the capability class on the right with the correct definitions.

_____a. Soils having severe limitations that make them generally unsuited for cultivation and limits their use largely to pasture or range, woodland, or wildlife food and cover

1. Class I

2. Class II

3. Class III

_____b. Soils and land forms having limitations that preclude their use for commercial plant production and restrict their use to wildlife, recreation, water supply, or scenic purposes

_____c. Soils having severe limitations that reduce the choice of plants or require special conservation practices or both

_____d. Soils having little or no erosion hazards, but have other limitations that are impractical to remove that limits their use largely to pasture, range, woodland or wildlife food and cover; these may include very poor drainage with wet poorly drained profiles or frequently flood areas

_____e. Soils having very severe limitations that restrict the choice of plants, require very careful management, special conservation or both

_____f. Soils having some limitations that reduce the choice of plants or require moderate conservation practices

_____g. Soils having few limitations that restrict their use; overhead water does not change the land class; treatment is usually on adjacent soils

_____h. Soils having very severe limitations that make them unsuited for cultivation and restricts their use largely to grazing, woodland, or wildlife

8. Classify the eight land capability classes according to their proper usage by writing the class number or numbers by the statement

   a. Suited for cultivation and other uses such as grazing, forestry, or wildlife food and cover ____________

   b. Land not suited for cultivation, grazing, or forestry____________

   c. Land not suited for cultivation; suited for grazing, forestry, or wildlife food and cover ____________

9. Select the best land class possible for each of the following factors.

   ____________a. Loamy soil

   ____________b. Shallow depth

   ____________c. Slow permeability

   ____________d. Strongly sloping

   ____________e. Severe erosion

___________f. Very slow surface runoff

10. Select the recommended land treatments for Class V land that has an overhead water problem and soil test indicates a acid soil by placing "X" in the blank to the left.

Vegetative

_____a. Use soil conserving and/or soil improving crops every fourth or fifth year

_____b. Use soil conserving and/or soil improving crops every third or fourth year

_____c. Use soil conserving and/or soil improving crops every second year

_____d. Use soil conserving and/or soil improving crop every year

_____e. Do not burn crop residue

_____f. Use residue management and/or minimum tillage

_____g. Establish recommended grass or grasses and legumes

_____h. Use proper pasture and range management

_____i. Protect land from burning

_____j. Use control grazing

_____k. Plant recommended trees

_____l. Harvest trees selectively

_____m. Use only for wildlife or recreation area

Mechanical

_____n. Control brush or trees

_____o. Terrace and farm on contour

_____p. Maintain terraces

_____q. Construct diversion terraces

_____r. Install drainage system

_____s. Control gullies

_____t. No mechanical treatment needed

Fertilizer and soil amendments

_____u. Lime

_____v. Phosphate (P)

_____w. Potash (K)

_____x. Nitrogen (N)

_____y. Nitrogen, phosphate, and potash (NPK)

11. Circle the leter of the soil amendment that would be made to land that was highly acid.

    a. Nitrogen

    b. Nitrogen and potash

    c. Lime

12. List the two combinations which with gently sloping lower the land capability class.

    a.

    b.

13. Apply the following land class factors and field conditions to the judging score card.

    a. Texture--When rubbed between the fingers the soil feeld sticky

    b. Permeability--Crumbly, clayey subsoil

    c. Depth--Eighteen inches

    d. Slope--Six inch fall in each 100 feet

    e. Erosion--Twenty percent of topsoil removed, no gullies

    f. Surface drainage--Surplus water is an occasional problem

    g. Soil test show deficiencies in potash

    h. No mechanical treatment needed

Ag. IV - 37-C

LAND JUDGING SCORE CARD

LJ-1

(Indicate your answer by an X in the square with number.)

PART I—LAND CLASS FACTORS

SCORE

A. SURFACE TEXTURE
- ☐ 1. Sandy soils
- ☐ 2. Loamy soils
- ☐ 3. Clayey soils

B. PERMEABILITY
- ☐ 1. Rapid
- ☐ 2. Moderate
- ☐ 3. Slow
- ☐ 4. Very slow

C. DEPTH OF SOIL
- ☐ 1. Deep
- ☐ 2. Moderately deep
- ☐ 3. Shallow
- ☐ 4. Very shallow

D. SLOPE
- ☐ 1. Nearly level
- ☐ 2. Gently sloping
- ☐ 3. Moderately sloping
- ☐ 4. Strongly sloping
- ☐ 5. Steep
- ☐ 6. Very steep

E. EROSION—WIND & WATER
- ☐ 1. None to slight
- ☐ 2. Moderate
- ☐ 3. Severe
- ☐ 4. Very severe

F. SURFACE RUNOFF
- ☐ 1. Rapid
- ☐ 2. Moderate
- ☐ 3. Slow
- ☐ 4. Very slow

G. MAJOR FACTORS — That keep area out of Class I:
- ☐ 1. Texture
- ☐ 2. Permeability
- ☐ 3. Depth
- ☐ 4. Slope
- ☐ 5. Erosion
- ☐ 6. Runoff
- ☐ 7. Wetness
- ☐ 8. Flooding
- ☐ 9. None

H. LAND CAPABILITY CLASS
- ☐ 1. Class I
- ☐ 2. Class II
- ☐ 3. Class III
- ☐ 4. Class IV
- ☐ 5. Class V
- ☐ 6. Class VI
- ☐ 7. Class VII
- ☐ 8. Class VIII

Contestant No. ____________

Field No. ____________

Name ____________________

Address ____________________

County or Chapter ____________________

Organization ____________________

PART II—RECOMMENDED LAND TREATMENTS—
Needed for land capability classes

SCORE

VEGETATIVE

Use soil conserving and/or soil improving crops:
- ☐ 1. Every 4th or 5th year.
- ☐ 2. Every 3rd or 4th year.
- ☐ 3. Every 2nd year.
- ☐ 4. Every year.

- ☐ 5. Do not burn crop residue.
- ☐ 6. Residue management and/or minimum tillage.
- ☐ 7. Establish recommended grass or grasses or legumes.
- ☐ 8. Proper pasture and range management.
- ☐ 9. Protect from burning.
- ☐ 10. Control grazing.
- ☐ 11. Plant recommended trees.
- ☐ 12. Harvest trees selectively.
- ☐ 13. Use only for wildlife or recreation area.

MECHANICAL
- ☐ 14. Control brush or trees.
- ☐ 15. Terrace and farm on contour.
- ☐ 16. Maintain terraces.
- ☐ 17. Construct diversion terraces.
- ☐ 18. Install drainage system.
- ☐ 19. Control gullies.
- ☐ 20. No mechanical treatment needed.

FERTILIZER & SOIL AMENDMENTS
- ☐ 21. Lime
- ☐ 22. Phosphate (P)
- ☐ 23. Potash (K)
- ☐ 24. Nitrogen (N)
- ☐ 25. Nitrogen, Phosphate and Potash (NPK)
- ☐ 26. Fertilizer or soil amendments not needed.

SCORE PART I
________ (Possible 40)

SCORE PART II
________ (Possible 30)

TOTAL SCORE
(Possible 70) ________

Cooperative Extension Service, Kansas State University, Manhattan, Kansas

7-75—15M

(Note The ability to judge a field using the land judging score card will be demonstrated at the discretion of the instructor.)

LAND JUDGING
UNIT I

ANSWERS TO TEST

1. a. 11

   b. 12

   c. 8

   d. 10

   e. 9

   f. 14

   g. 15

   h. 13

   i. 1

   j. 2

   k. 16

   l. 5

   m. 6

   n. 3

   o. 7

   p. 4

2. Any three of the following:

   a. Aids in the understanding and importance of basic soil differences as they affect crop production and erosion

   b. Helps to determine management practices important to proper use of soil and water

   c. Develops understanding of different soil and water conservation

   d. Aids in understanding the influence of land features on production and land protection

3. a. Surface texture
   b. Permeability
   c. Depth of soil
   d. Slope
   e. Erosion
   f. Surface runoff

4. a. 1) f)
      2) e)
      3) c)
      4) a)
      5) b)
      6) d)
   b. 1) b)
      2) a)
      3) d)
      4) c)
   c. 1) b)
      2) a)
      3) c)
      4) d)
   d. 1) d)
      2) a)
      3) c)
      4) b)
   e. 1) c)
      2) d)
      3) a)
      4) b)

5. a. Loamy soil

   b. Clayey soil

   c. Sandy soil

6. a. Loamy-soil--Has a touch of velvet or feel of wheat flour

   b. Clayey soil--Sticky feeling when rubbed between fingers

   c. Sandy soil--Rough, gritty feeling

7. a. 6

   b. 8

   c. 3

   d. 5

   e. 4

   f. 2

   g. 1

   h. 7

8. a. I, II, III, IV

   b. VIII

   c. V, VI, VII

9. a. I

   b. III

   c. I

   d. IV

   e. VI

   f. II

10. g

    h

    i

    j

    q

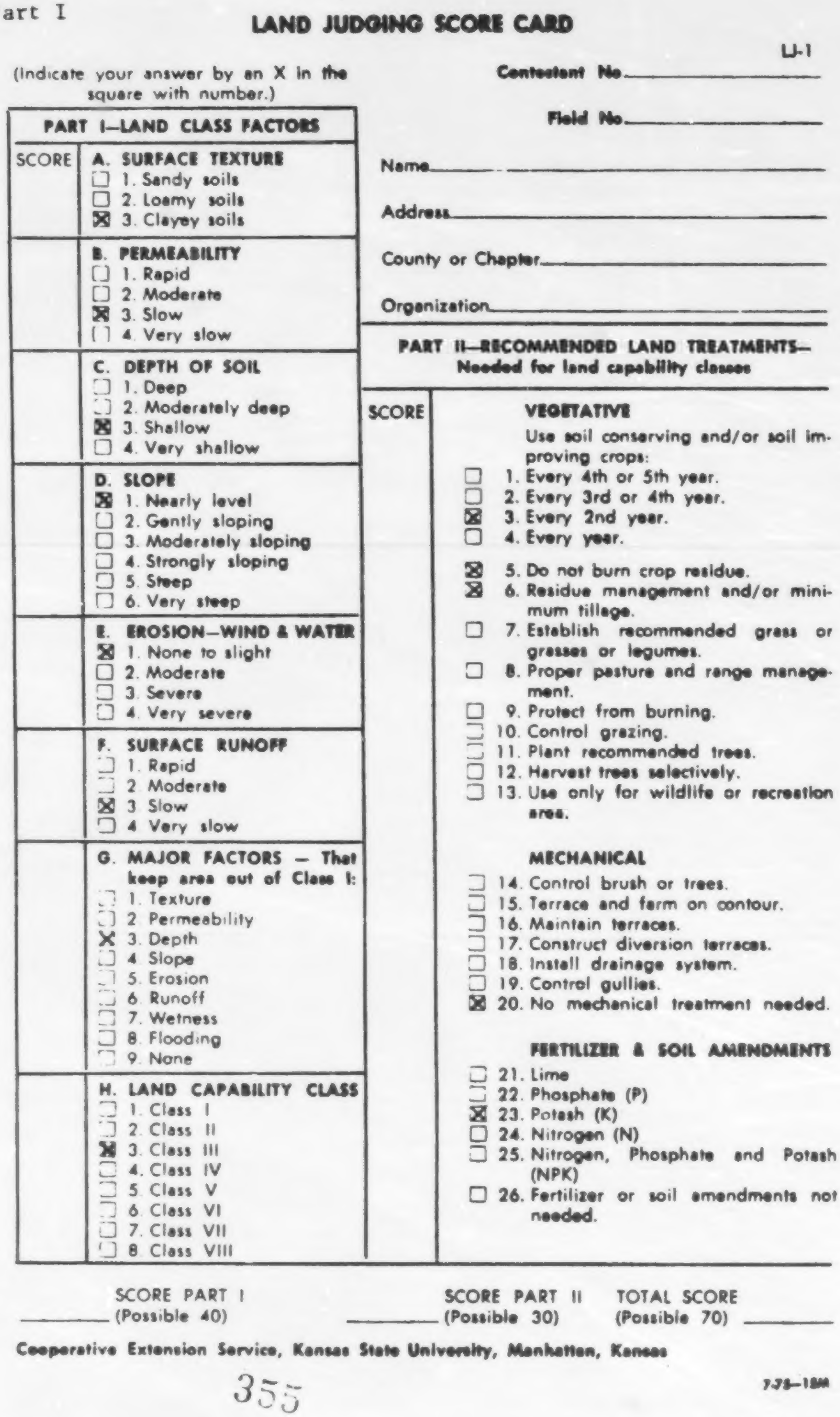
    r

    u

11. c

12. a. Very Slow permeability b. Moderate erosion

13. Part I



LAND JUDGING SCORE CARD

LJ-1

(Indicate your answer by an X in the square with number.)

Contestant No.__________

Field No.__________

Name__________

Address__________

County or Chapter__________

Organization__________

PART I—LAND CLASS FACTORS

SCORE	
	A. SURFACE TEXTURE ☐ 1. Sandy soils ☐ 2. Loamy soils ☒ 3. Clayey soils
	B. PERMEABILITY ☐ 1. Rapid ☐ 2. Moderate ☒ 3. Slow ☐ 4. Very slow
	C. DEPTH OF SOIL ☐ 1. Deep ☐ 2. Moderately deep ☒ 3. Shallow ☐ 4. Very shallow
	D. SLOPE ☒ 1. Nearly level ☐ 2. Gently sloping ☐ 3. Moderately sloping ☐ 4. Strongly sloping ☐ 5. Steep ☐ 6. Very steep
	E. EROSION—WIND & WATER ☒ 1. None to slight ☐ 2. Moderate ☐ 3. Severe ☐ 4. Very severe
	F. SURFACE RUNOFF ☐ 1. Rapid ☐ 2. Moderate ☒ 3. Slow ☐ 4. Very slow
	G. MAJOR FACTORS — That keep area out of Class I: ☐ 1. Texture ☐ 2. Permeability ☒ 3. Depth ☐ 4. Slope ☐ 5. Erosion ☐ 6. Runoff ☐ 7. Wetness ☐ 8. Flooding ☐ 9. None
	H. LAND CAPABILITY CLASS ☐ 1. Class I ☐ 2. Class II ☒ 3. Class III ☐ 4. Class IV ☐ 5. Class V ☐ 6. Class VI ☐ 7. Class VII ☐ 8. Class VIII

PART II—RECOMMENDED LAND TREATMENTS—
Needed for land capability classes

SCORE	
	VEGETATIVE Use soil conserving and/or soil improving crops: ☐ 1. Every 4th or 5th year. ☐ 2. Every 3rd or 4th year. ☒ 3. Every 2nd year. ☐ 4. Every year. ☒ 5. Do not burn crop residue. ☒ 6. Residue management and/or minimum tillage. ☐ 7. Establish recommended grass or grasses or legumes. ☐ 8. Proper pasture and range management. ☐ 9. Protect from burning. ☐ 10. Control grazing. ☐ 11. Plant recommended trees. ☐ 12. Harvest trees selectively. ☐ 13. Use only for wildlife or recreation area.
	MECHANICAL ☐ 14. Control brush or trees. ☐ 15. Terrace and farm on contour. ☐ 16. Maintain terraces. ☐ 17. Construct diversion terraces. ☐ 18. Install drainage system. ☐ 19. Control gullies. ☒ 20. No mechanical treatment needed.
	FERTILIZER & SOIL AMENDMENTS ☐ 21. Lime ☐ 22. Phosphate (P) ☒ 23. Potash (K) ☐ 24. Nitrogen (N) ☐ 25. Nitrogen, Phosphate and Potash (NPK) ☐ 26. Fertilizer or soil amendments not needed.

________ SCORE PART I (Possible 40)

________ SCORE PART II (Possible 30)

TOTAL SCORE (Possible 70) ________

Cooperative Extension Service, Kansas State University, Manhattan, Kansas

7-75—18M

HOMESITE EVALUATION
UNIT II

TERMINAL OBJECTIVES

After completion of this unit the student should be able to evaluate land being used for homes and other nonagricultural uses, recommend limitations, and complete the score card. This knowledge will be evidenced through demonstration and scoring eighty percent at a field site.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Discuss new terms associated with homesite evaluation in a short paragraph.
2. Select, when given nine features; the proper factor
3. Select the degree of limitation when the feature has been given.
4. Demonstrate the ability to:
    a. Complete a Homesite evaluation score card when given the characteristics of a site.
    b. Judge a site and complete the score card.

HOMESITE EVALUATION
UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Conduct a field trip to evaluate a previously prepared homesite

Student:

1. Read objective sheet
2. Study information sheet
3. Complete assignment sheets
4. Participate in field trip

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Assignment sheets
    #1--Questions on Homesite Evaluation
    #2--Selecting Factors in Homesite Evaluation and the degree of limitation (Part I and II of score card)
    #3--Score Card Evaluation at Site
4. Answers to assignment sheets

HOMESITE EVALUATION
UNIT II

INFORMATION SHEET

I. Terms and definitions

  A. Shrink-Swell--determined by permeability and texture in the heaviest (most clayey) level of the soil.

  B. Water table--the depth of water in the soil. Important in sites due to increased cost and problems in construction.

  C. Flooding--depending on frequency of water covering the area, the degree of limitation.

II. Many of the factors are the same as in land judging

III. Factors Evaluated in Homesite Selection

  A. Texture--surface

    1. Not a factor in sewage lagoons

    2. In other situations

      a. Sandy--moderate limitations

      b. Loamy--slight limitations

      c. Clayey--severe limitations

  B. Permeability

    1. Very Slow Permeability--severe for foundations, moderate for lawns, very severe for septic, slight for lagoons

    2. Slow Permeability--moderate for foundation and lawns, severe for septic, slight for lagoons

    3. Moderate Permeability--slight for foundations, lawns and septic, moderate for lagoons

    4. Rapid Permeability--slight for foundations, moderate for lawns, slight for septic, severe for lagoons

  C. Soil Depth

    1. Very Shallow (less than 10")--severe for foundations, very severe for others

    2. Shallow (10-20")--moderate for foundations, severe for lawns, very severe for others

INFORMATION SHEET

3. Moderately deep (20-40")--slight for foundations and lawns, severe for others

4. Deep (40-72")--slight for foundations and lawns, moderate for others

5. Very deep (over 72")--slight limitations

D. Slopes

1. Nearly level (0-.5%)--moderate on lawns, slight for others

2. Gently sloping (.5-5%)--slight limitations

3. Moderate (5-8%)--slight for septic, moderate for others

4. Strong (8-15%)--moderate for septic, severe for others

5. Very strong (over 15%)--severe for septic, very severe for others

E. Erosion

1. None to slight and moderate--slight limitations

2. Severe--moderate limitations

3. Very severe--severe limitations

F. Surface runoff

1. Slow (nearly level areas and deep sands)--severe for foundations and septic, slight for lawns

2. Moderate (gently sloping)--slight limitations

3. Rapid (over 5% slope)--severe for lawns, slight for others

G. Shrink-Swell (heaviest layer)

1. Low (sands, loams, fine sandy loams)--slight limitations

2. Moderate (silt loams, clay loams, and silty clay loams)--moderate limitations

3. High (silty clay, and clay)--slight for lagoons, severe for others

H. Water table

1. Deep (none above 72")--slight limitations

INFORMATION SHEET

   2. Moderately deep (48-72")--moderate limitations
   3. Shallow (less than 48")--severe limitations

I. Flooding

   1. None--slight limitations
   2. Occasional (less than 1 in 5 years) severe limitations
   3. Frequent (more than 1 in 5 years)--very severe limitations

IV. Final Evaluation

   A. Consider limitations marked in columns
   B. Mark the poorest limitation in the final evaluation boxes

HOMESITE EVALUATION
UNIT II

ASSIGNMENT SHEET #1--QUESTIONS ON HOMESITE EVALUATION

Answer the following questions.

1. What level in the soil has the highest level of shrink/swell?

2. What importance does the depth of water table play in homesite evaluation?

3. Flooding in more than one year out of every five years would be what degree of flooding?

   a. None

   b. Occasional

   c. Frequent

HOMESITE EVALUATION
UNIT II

ASSIGNMENT #2--SELECTING FACTORS IN HOMESITE EVALUATION AND THE DEGREE OF LIMITATION

Selecting the factors.

Directions: Using the following information, fill out Part I of the Homesite Evaluation scorecard.

A. Loamy topsoil--18"

B. Clay loam subsoil

C. 81" soil depth

D. 1 1/2' / 100' slope

E. Original topsoil was 22" deep

F. Water table at 78"

G. Flooding is not a problem

Selecting degree of limitation.

Directions: From the information above, fill out Part II of the same evaluation score card as to the degree of limitation for each category and the final evaluation.

ASSIGNMENT SHEET #2

SCORE CARD—LAND JUDGING FOR HOMESITE EVALUATION

Contestant No ____________ Field No ____________

Name ____________ Address ____________

County or Chapter ____________

	PART 1 Land Factors	PART 2 Planned Use—One Family Dwelling Without Basement Interpretations of Limitations in Terms of Dwelling Site				
SCORE	Features of the Site Being Considered	Degree of Limitation	* Foundations W O Basement	Lawns, Shrubs and Gardens	Septic System	Lagoon Sewage
	A TEXTURE SURFACE					
	☐ Sandy	Slight	☐	☐	☐	
	Loamy	Moderate	☐	☐	☐	
	☐ Clayey	Severe	☐	☐	☐	
	B PERMEABILITY					
	☐ Very Slow < 0.06"/hr	Slight	☐	☐	☐	☐
	☐ Slow 0.06—0.6"/hr	Moderate	☐	☐	☐	☐
	☐ Moderate 0.6—2.0"/hr	Severe	☐	☐	☐	☐
	☐ Rapid 2.0"/hr +	V. Severe	☐	☐	☐	☐
	C SOIL DEPTH					
	☐ V Shallow < 10"	Slight	☐	☐	☐	☐
	☐ Shallow 10 — 20"	Moderate	☐	☐	☐	☐
	☐ Mod Deep 20 — 40"	Severe	☐	☐	☐	☐
	☐ Deep 40 72"	V. Severe	☐	☐	☐	☐
	☐ V Deep over 72"					
	D SLOPE					
	☐ Nearly Level 0 — 0.5%	Slight	☐	☐	☐	☐
	☐ Gently Sloping 0.5 — 5.0%	Moderate	☐	☐	☐	☐
	☐ Mod Sloping 5.0 — 8%	Severe	☐	☐	☐	☐
	☐ Str Sloping 8.0 — 15%	V Severe	☐	☐	☐	☐
	☐ V Str Sloping 15.0% +					
	E EROSION					
	☐ None — Slight — Moderate	Slight	☐	☐	☐	☐
	☐ Severe	Moderate	☐	☐	☐	☐
	☐ Very Severe	Severe	☐	☐	☐	☐
	F SURFACE RUNOFF					
	☐ Slow — nearly level areas and deep sands	Slight	☐	☐	☐	
	☐ Moderate—Slopes 0.5—5%	Moderate	☐	☐	☐	
	☐ Rapid — Slopes over 5%	Severe	☐	☐	☐	
	G SHRINK-SWELL (heaviest layer)					
	☐ Low	Slight	☐		☐	☐
	☐ Moderate	Moderate	☐		☐	☐
	☐ High	Severe	☐		☐	☐
	H WATER TABLE (permanent or temporary)					
	☐ Deep — none evident above 72"	Slight	☐	☐	☐	☐
	☐ Mod. Deep — 48-72"	Moderate	☐	☐	☐	☐
	☐ Shallow — less than 48"	Severe	☐	☐	☐	☐
	I FLOODING					
	☐ None	Slight	☐	☐	☐	☐
	☐ Occasional < 1 year in 5	Moderate	☐	☐	☐	☐
	☐ Frequent more than 1 year in 5	Severe	☐	☐	☐	☐
		V Severe	☐	☐	☐	☐
	FINAL EVALUATION					
	All factors none to slight	Slight	☐	☐	☐	☐
	One or more factors mod None Severe	Moderate	☐	☐	☐	☐
	One or more factors severe None V Severe	Severe	☐	☐	☐	☐
	One or more factors Very severe	V Severe	☐	☐	☐	☐

SCORE PART 1 ____________ (Possible 20)

SCORE PART 2 ______ ______ ______ ______ (Possible 20 for each use)

PART 1 AND 2—TOTAL SCORE ____________ (Possible 100)

Cooperative Extension Service, Kansas State University, Manhattan, Kansas

7-75-10M

Assignment Sheet #3   Score Card Evaluation at Site

Fill out this Homesite Evaluation card at the actual field site selected by the instructor.

SCORE CARD—LAND JUDGING FOR HOMESITE EVALUATION

Contestant No ____________ Field No. ____________

Name ____________ Address ____________

County or Chapter ____________

		PART 2 Planned Use—One Family Dwell Without Basement Interpretations of Limitations in Terms of				
		Dwelling Site				
	PART 1 Land Factors					
SCORE	Features of the Site Being Considered	Degree of Limitation	Foundations W O Basement	Lawns, Shrubs and Gardens	Septic System	Lagoon Sewage
	A TEXTURE SURFACE					
	Sandy	Slight	☐	☐	☐	
	Loamy	Moderate	☐	☐	☐	
	Clayey	Severe	☐	☐	☐	
	B PERMEABILITY					
	☐ Very Slow < 0.06"/hr	Slight	☐	☐	☐	☐
	☐ Slow 0.06—0.6"/hr.	Moderate	☐	☐	☐	☐
	☐ Moderate 0.6—2.0"/hr.	Severe	☐	☐	☐	☐
	☐ Rapid 2.0"/hr. +	V. Severe	☐	☐	☐	☐
	C SOIL DEPTH					
	☐ V. Shallow < 10"	Slight	☐	☐	☐	☐
	☐ Shallow 10 — 20"	Moderate	☐	☐	☐	☐
	☐ Mod. Deep 20 — 40"	Severe	☐	☐	☐	☐
	☐ Deep 40 72"	V. Severe	☐	☐	☐	☐
	☐ V. Deep over 72"					
	D SLOPE					
	☐ Nearly Level 0 — 0.5%	Slight	☐	☐	☐	☐
	☐ Glently Sloping 0.5 — 5.0%	Moderate	☐	☐	☐	☐
	☐ Mod. Sloping 5.0 — 8%	Severe	☐	☐	☐	☐
	☐ Str. Sloping 8.0 — 15%	V. Severe	☐	☐	☐	☐
	☐ V. Str. Sloping 15.0% +					
	E EROSION					
	☐ None — Slight — Moderate	Slight	☐	☐	☐	☐
	☐ Severe	Moderate	☐	☐	☐	☐
	☐ Very Severe	Severe	☐	☐	☐	☐
	F SURFACE RUNOFF					
	☐ Slow — nearly level areas and open sands	Slight	☐	☐	☐	
	☐ Moderate—Slopes 0.5—5%	Moderate	☐	☐	☐	
	☐ Rapid — Slopes over 5%	Severe	☐	☐	☐	
	G SHRINK-SWELL (heaviest layer)					
	☐ Low	Slight	☐		☐	☐
	☐ Moderate	Moderate	☐		☐	☐
	☐ High	Severe	☐		☐	☐
	H WATER TABLE (permanent or temporary)					
	☐ Deep — none evident above 72"	Slight	☐	☐	☐	☐
	☐ Mod. Deep — 48-72"	Moderate	☐	☐	☐	☐
	☐ Shallow — less than 48"	Severe	☐	☐	☐	☐
	I FLOODING					
	☐ None	Slight	☐	☐	☐	☐
	☐ Occasional 1 year in 5	Moderate	☐	☐	☐	☐
	☐ Frequent more than 1	Severe	☐	☐	☐	☐
	year in 5	V. Severe	☐	☐	☐	☐
	FINAL EVALUATON					
	All factors none to slight	Slight	☐	☐	☐	☐
	One or more factors mod None Severe	Moderate	☐	☐	☐	☐
	One or more factors severe None V. Severe	Severe	☐	☐	☐	☐
	One or more factors Very severe	V. Severe	☐	☐	☐	☐

SCORE PART 1 ____________ (Possible 20)

SCORE PART 2 ______ ______ ______ ______ (Possible 20 for each use)

PART 1 AND 2—TOTAL SCORE ____________ (Possible 100)

HOMESITE EVALUATION
UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. Heaviest layer--clay

2. Basement and septic system construction

3. Frequent

Assignment Sheet #2

	Foundation	Lawns	Septic	Lagoon
A. Loam	slight	slight	slight	slight
B. Slow	moderate	moderate	severe	slight
C. Very deep	slight	slight	slight	slight
D. Gently sloping	slight	slight	slight	slight
E. None-Slight-Mod.	slight	slight	slight	slight
F. Moderate	slight	slight	slight	slight
G. Moderate	moderate	moderate	moderate	moderate
H. Deep	slight	slight	slight	slight
I. None	slight	slight	slight	slight
Final Evaluation	moderate	moderate	severe	slight

Assignment Sheet #3

Evaluated by instructor at site

SOIL SAMPLING
UNIT III

TERMINAL OBJECTIVES

After completion of Unit III, the student should be able to demonstrate the proper procedure for obtaining a representative soil sample from a given field and prepare this sample for mailing and or processing. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil testing with the proper definitions.
2. Explain in writing reasons for testing soil.
3. Select from a list major items for which soils are tested.
4. Select the procedure for collecting representative soil samples from a given field.
5. Select from a list areas from which soil samples should not be taken.
6. Name items of information that should be submitted with soil samples, in order for proper fertilizer recommendations to be made.
7. Identify four tools used in collecting soil samples.
8. Name two locations in Kansas where soil samples can be sent for testing.
9. Demonstrate the ability to secure a soil sample and prepare it for mailing or processing.

SOIL SAMPLING
UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Conduct field trip to perform the steps of soil sampling
7. Give test

Students:

1. Read objective sheet
2. Study information sheet
3. Complete assignment sheets
4. Participate in field trip to perform the steps of soil sampling
5. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Dividing a Field to be Sampled
    - TM 2--Using Sampling Tools
    - TM 3--Tools Used in Collecting Samples
    - TM 4--How to take a soil sample and fill out information sheet.
    - TM 5--Soil Sample Information Sheet
    - TM 6--Soil Sample Containers

4. Assignment sheets
    - #1--Selecting Sampling Sites
    - #2--Securing a Soil Sample
5. Answers to assignment sheets
6. Test
7. Answers to test

References:

1. Soils, Publication AP-8. Blacksburg, Virginia: Agri-Education, College of Education, Virginia Polytechnic Institute and State University, 1972.

2. 'Testing Soil for Fertilizer Needs,' OSU Extension Fact Sheet No. 2207 Stillwater, Oklahoma: Extension Service, Oklahoma State University.

3. 'Test for Available Nitrogen' Kansas State University Extension, L-275, Manhattan, Kansas, 66502.

4. 'Lime and Fertilizer Recommendations, Kansas State University Extension, C-352, Manhattan, Kansas, 66502.

5. 'Zinc and Iron Deficiency in Field Crops', L0360, Kansas State University Extension, Manhattan, Kansas, 66502.

SOIL SAMPLING
UNIT III

INFORMATION SHEET

I. Terms and definitions

  A. Fertilizer--Any natural or manufactured material added to the soil in order to supply one or more plant nutrients.

  B. Fertilizer analysis--Refers to the minimum percentage of nitrogen, available phosphorus, and water soluble potash in a fertilizer

  C. Soil pH--Refers to the degree of acidity or alkalinity of a soil

  (NOTE: "pH" is an abbreviation for "potential hydrogen"; used chemically to express the hydrogen ion concentration of a solution.)

  D. Alkaline soils--Soils having a pH reading of above 7.0

  E. Acidic soils--Those soils having a pH reading less than 7.0

  (NOTE: Each pH unit below 7.0 indicates an increase in acidity of ten times over the preceeding pH value. Each unit above 7.0 indicates ten times increase in alkalinity.)

  F. Organic matter--That fraction of soil which results from decomposition of vegetable and animal matter through the action of bacteria

  (NOTE: The nitrogen in soil is largely stored in the organic matter.)

  G. Soil test--A chemical means of determining the nutrient supplying power of a soil

II. Reasons for soil testing

  A. Estimates how much a particular nutrient the soil will provide to a crop

  B. Determines the balance of available plant food nutrients

  C. Measures the degree of soil acidity and soil alkalinity

III. Major items for which soils are tested

  A. Phosphorus

  B. Potassium

INFORMATION SHEET

C. Nitrogen

(NOTE: The test is often for organic matter since nitrogen is almost in direct proportion to organic matter.)

D. Calcium

E. Magnesium

F. Hydrogen ion concentration--pH test

IV. Procedure for collecting representative soil samples for a given field (Transparencies 1 and 2)

A. Divide fields to be sampled into uniform areas of not more than ten acres

(NOTE: Uniform areas may be divided into forty acres.)

B. Samples should be taken from plow depth in cropland and from the top two or three inches in pasture land

C. Samples of uniform size should be put in a bucket and mixed

(NOTE: If tests are to be made for micronutrients use only a clean plastic bucket.)

D. Approximately five to ten samples should be taken in each field or area

E. Approximately one pint of the mixed soil should be placed in a suitable container

(NOTE: A small plastic bag is ideal.)

V. Areas from which soil samples should not be taken

A. Eroded spots

B. Areas with visible differences in soils

C. Small areas of noticeable differences in crop growth wit field

D. Back furrows

E. Small depressions

F. Areas in field that have been manured, limed, or otherwise treated differently

G. Fence rows

INFORMATION SHEET

H. Road beds

VI. Information submitted with sample

A. Name of county

B. Name and address of farmer

C. Size and location of field

D. Fertilizer history

E. Cropping history

F. Crop to be grown

G. Expected yield

VII. Tools used in collecting samples (Transparency 3)

A. Soil probe

B. Spade

C. Trowel

D. Soil auger

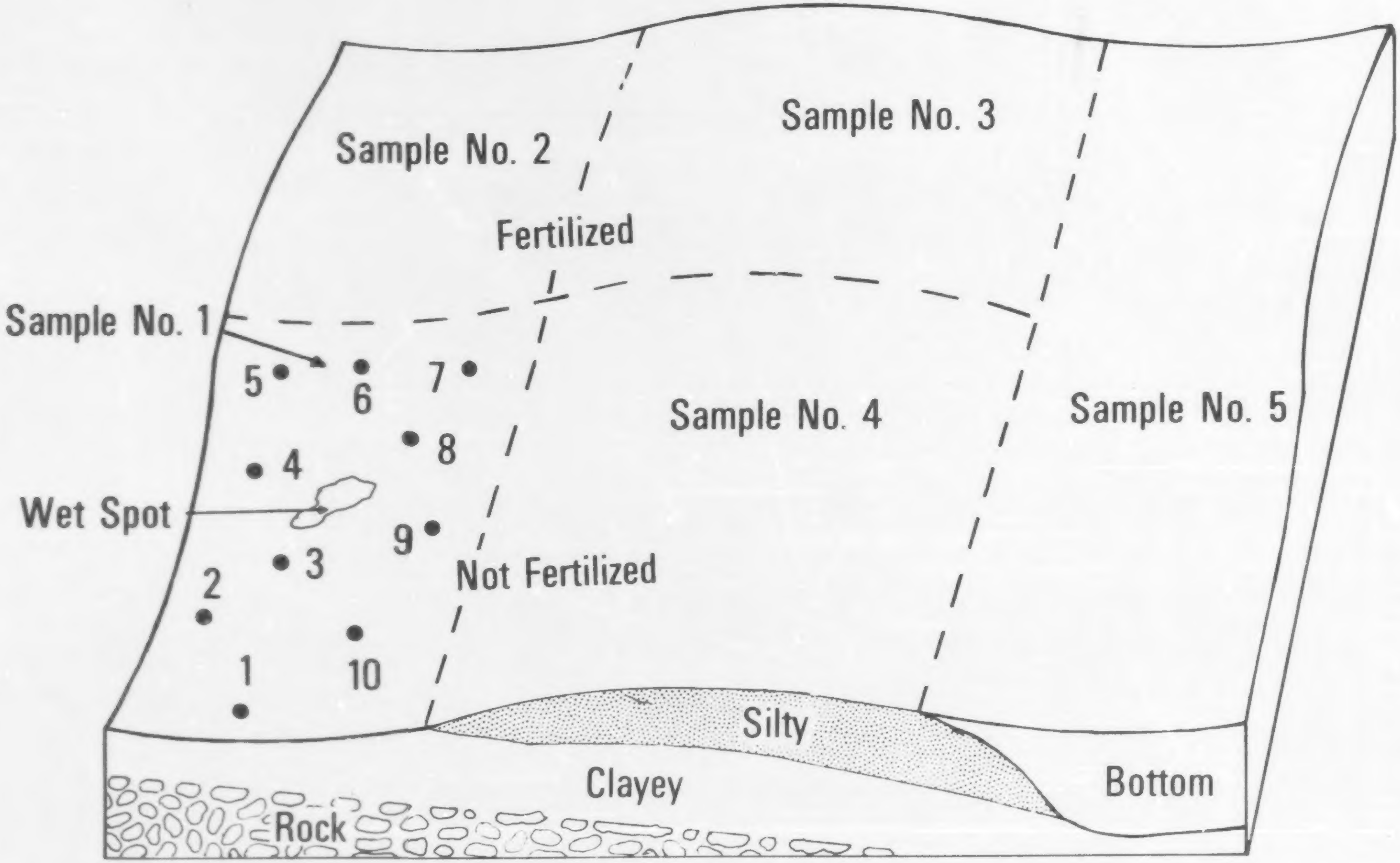
VIII. Location where soil samples can be sent for testing

A. County Ag Extension Agent

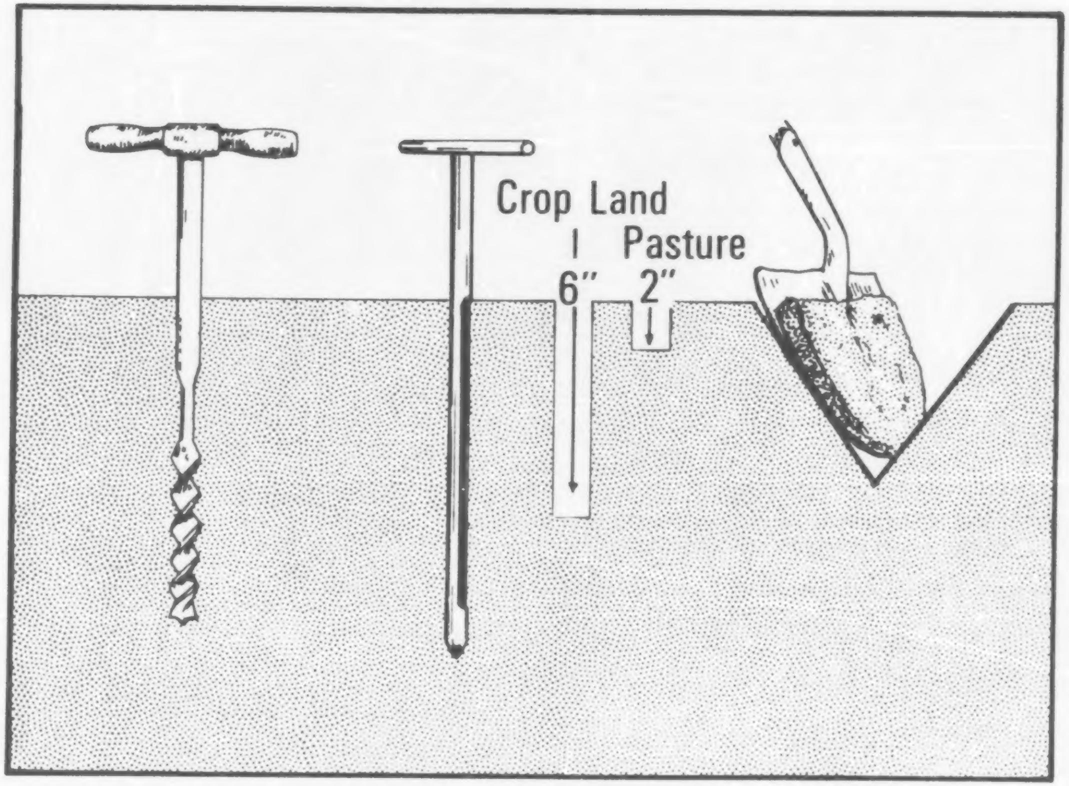
B. Agronomy Department, Kansas State University, Manhattan, Kansas.

C. Local Fertilizer Distributor

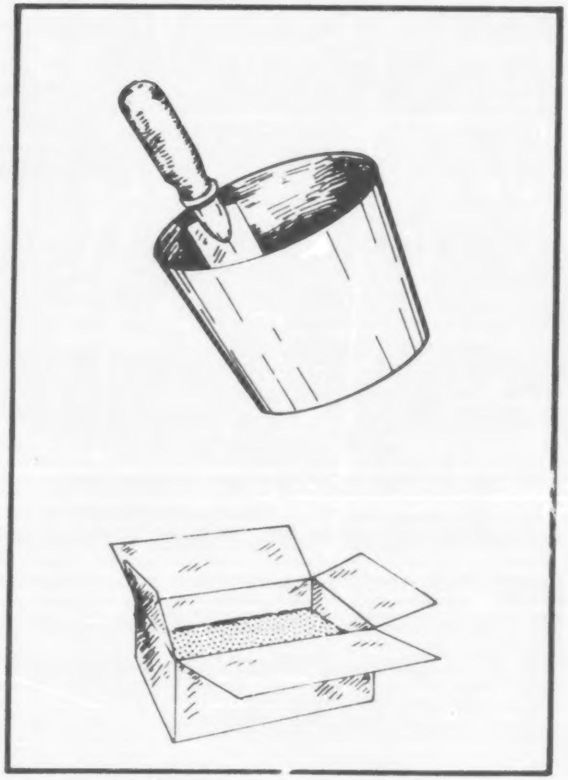
Dividing a Field to be Sampled


Sample No. 2
Sample No. 3
Fertilized
Sample No. 1
5
6
7
8
4
Wet Spot
9
3
2
1
10
Sample No. 4
Sample No. 5
Not Fertilized
Silty
Clayey
Bottom
Rock

Using Sampling Tools


Crop Land
Pasture
6"
2"

Use Proper Sampling Tools

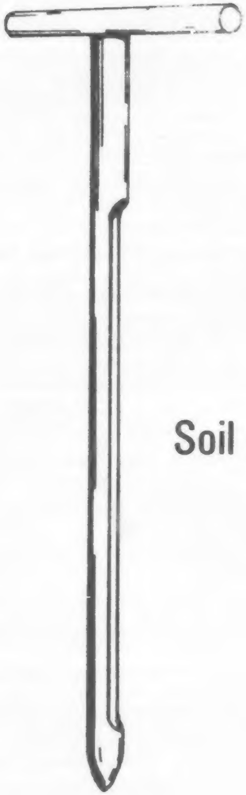


Mix Well in a Clean Pail

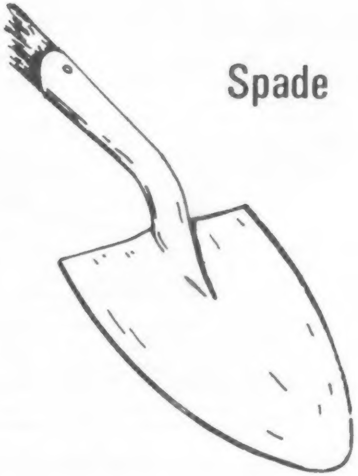
Ag. IV - 71-C

TM 2

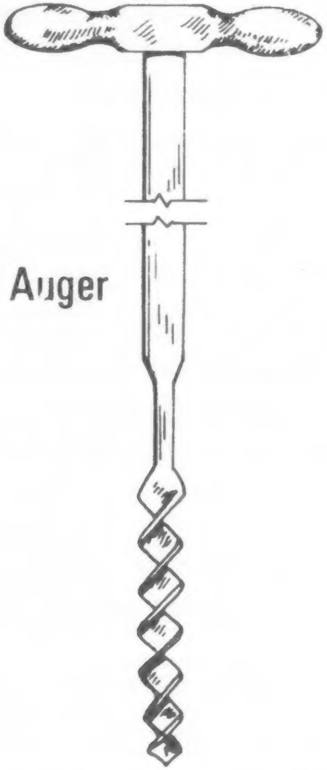
Tools Used in Collecting Samples



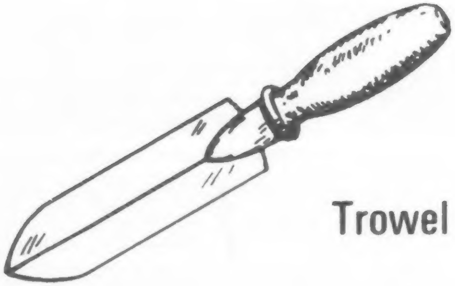
Soil Probe



Spade



Soil Auger



Trowel

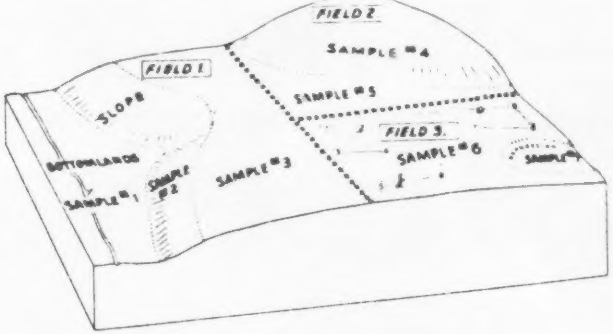
KANSAS STATE UNIVERSITY SOIL TESTING LABORATORY

HOW TO TAKE A SOIL SAMPLE

Test results can be no better than the sample collected in the field. Proper collection of soil samples is extremely important. Follow these steps to obtain a good sample:

1. To take the sample, you will need a sampling tube, auger or spade, and a clean pail. You also need soil sample containers and field information forms which may be obtained from your local county agent or fertilizer dealer.

2. Draw a map of the area to be sampled on the information sheet and divide your fields into uniform areas. Each area should have the same soil texture, color, slope, and previous fertilization and cropping history.



3. From each area, take a sample consisting of 20 to 30 cores or slices, mix thoroughly in a clean container, and then fill your soil sample container from this mixture. All row crops should be sampled to tillage depth and all permanent sod to 4 inches. If the available nitrogen test is desired, a sample to at least 24 inches is necessary. **Caution:** For the zinc test collect soil samples in a plastic container to avoid contamination from galvanized buckets or material made of rubber.

4. Avoid sampling in old fence rows, dead furrows, low spots, feeding areas, and other areas that might give misleading results. If information is desired on these unusual areas, obtain a separate sample from the area.

5. Be sure to label the soil container plainly and record the numbers on the soil contaner on the information sheet.

TM 4

6. Repeat the sampling procedure outlined on each area you want tested.

7. Air drying of the samples as soon as possible is necessary for the available nitrogen test. Air drying before shipment is desirable, but not essential for all other tests. **Do not use heat for drying.**

HOW TO FILL OUT INFORMATION SHEET

1. Fill in completely the general information section at the top.

2. Fill in as completely as possible the rest of the information. This is necessary before accurate lime and fertilizer recommendations can be given.

NOTE: These points are particularly critical. Be sure to . . .

- Indicate which tests are desired (see test description on reverse side).
- Indicate the intended crop and the following crop so that recommendations can be made for 2 years.
- Note any special conditions that might exist in the space for remarks so that the person making the recommendation may more fully visualize the conditions on your individual field.

HOW TO SHIP SAMPLES TO SOIL TESTING LAB

1. Take the samples to your local county extension office and they will forward them to the lab. Samples may be sent directly to the lab by placing in a shipping container or wrapping in heavy paper. Place the information sheet and remittance in a stamped envelope and attach it to the outside of package. Write your name and address in the upper left corner. Label shipping container "First Class Mail Enclosed." Tie securely.

2. Mail package to:

Soil Testing Laboratory
Agronomy Department
Kansas State University
Manhattan, Kansas 66506

or

Soil Testing Laboratory
Garden City Branch
Experiment Station
Garden City, Kansas 67846

3. Enclose check or money order payable to the Soil Testing Laboratory for all services requested. The sender pays the postage. Please do not send cash. We will not be responsible for cash sent through the mail.

Ag. IV - 75-

Soil Sample Information

SOIL TESTING LABORATORY
Agronomy Department
Kansas State University
Manhattan, Kansas 66506

and

SOIL TESTING LABORATORY
Garden City Branch Expt. Sta.
Kansas State University
Garden City, Kansas 67846

Name ____________________

Address ____________________ (Street or Route)

____________________ (City and State) ________ Zip Code

County ____________________

Legal Description ____________________

Date ______________ 19____

Sample(s) Submitted by: (If different than name at left)

Name ____________________

Address ____________________ (Street or Route)

____________________ (City and State) ________ Zip Code

Fee Payment Enclosed $________ Account No ________

For Laboratory Use Only

Fee Payment ____________________

Date Received ______________ 19____

Date Results Reported ______________ 19____

SAMPLE IDENTIFICATION					SOIL DESCRIPTION			IRRIGATION		PREVIOUS TREATMENTS							TEST DESIRED (✓) Refer to Fee Schedule						
					Slope	Drainage	Soil Type	Type	Leveling	Last Year					Lime								
Laboratory Number (Do not write below)	**Field Number or Letter**	**Sample Number or Letter**	**Depth i.e. 0-6" 0-24" 6-24"**	**Acres Represented by Sample**	L—level G—gentle S—steep I—irregular	P—poor G—good E—excessive	i.e. Geary Silt Loam	Sprinkler Surface	None Moderate Severe	Nitrogen (N) lbs./A	Phosphate (P_2O_5) lbs./A	Potash (K_2O) lbs./A	Zinc (Zn) lbs./A	Manure or Other Nutrients T./A. or lbs./A.	**Last Three Years**	Rate E.C.C. lbs./A	General Fertility	Available Nitrogen	Available Zinc	Available Iron	Combi. Avail. Zinc & Iron	Organic Matter	Lawn or Garden
															19___								
															19___								
															19___								
															19___								

MAP OF SAMPLE LOCATION ON FARM

		CROP HISTORY				DESIRED RECOMMENDATION			REMARKS
		Last Year		Two Years Ago					Note any special conditions of the soil or crops
Field Number or Letter	Sample Number or Letter	Crop	Yield bu./A or T./A	Crop	Yield bu./A or T./A	Crop to be Fertilized	Yield Goal bu./A or T./A	Crop Next Year	

DO NOT DETACH

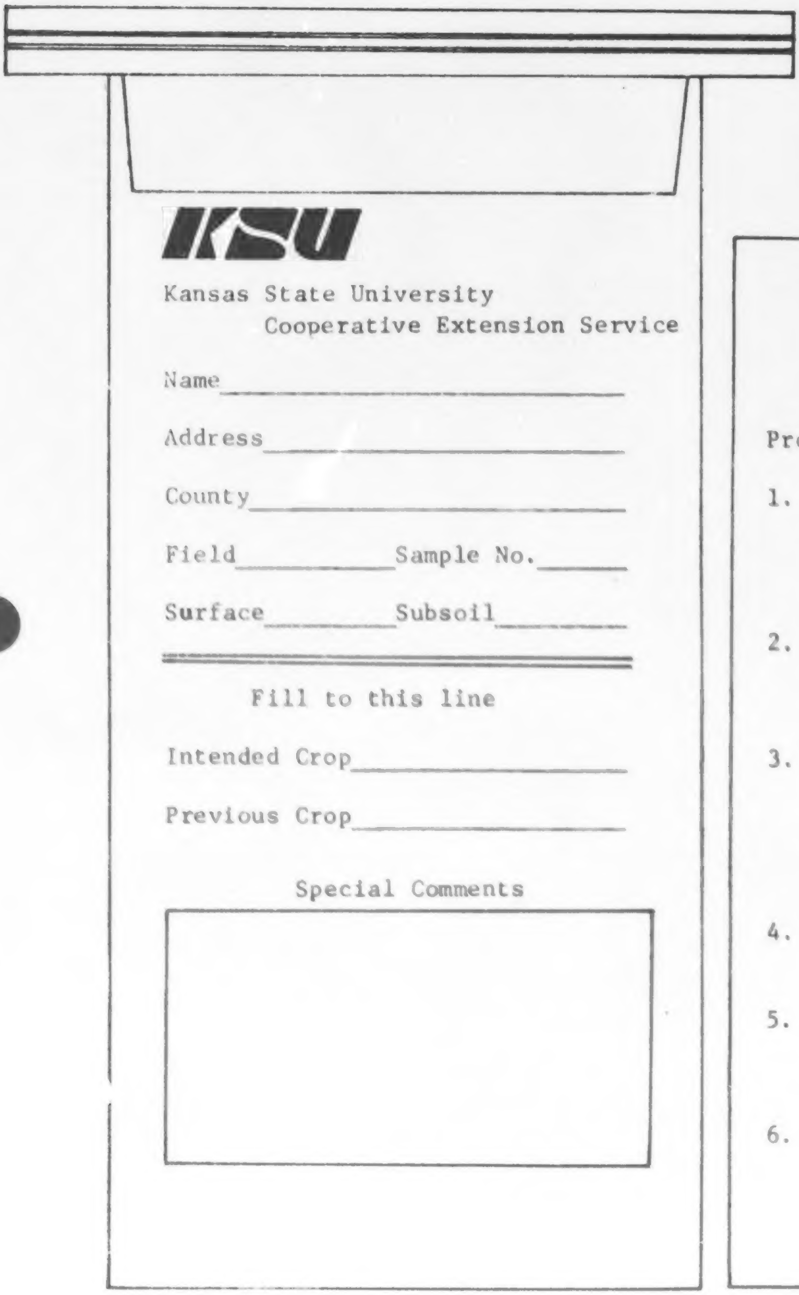
RETURN ALL 4 PARTS. THE ORIGINAL
WILL BE RETURNED TO YOU.

TKL 5

Ag IV - 77-C

Ag. IV - 79-C

SOIL SAMPLE CONTAINER



KSU

Kansas State University
Cooperative Extension Service

Name________________________

Address________________________

County________________________

Field__________ Sample No.______

Surface_________ Subsoil_________

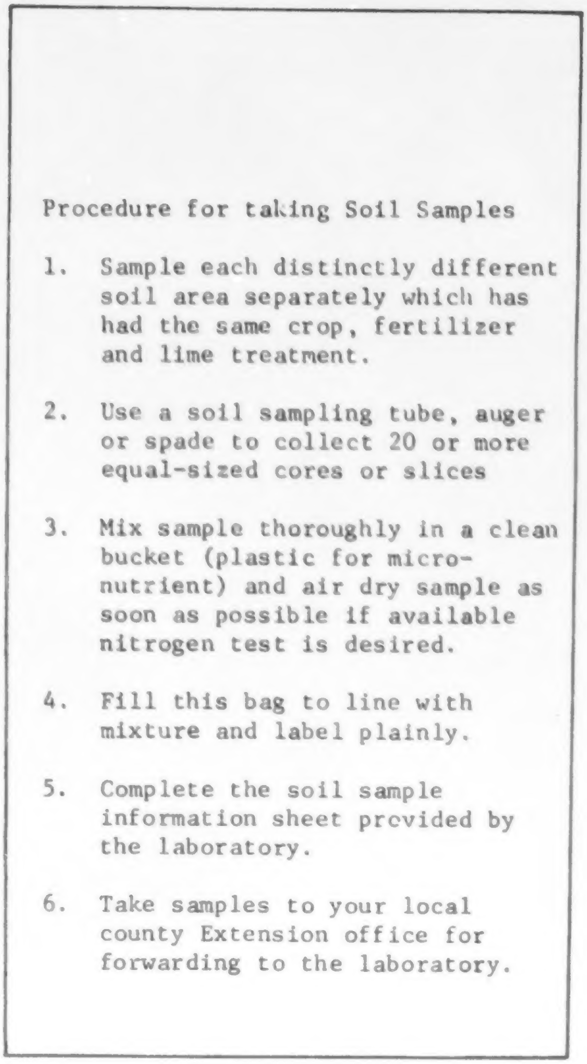
Fill to this line

Intended Crop__________________

Previous Crop__________________

Special Comments

FRONT



Procedure for taking Soil Samples

1. Sample each distinctly different soil area separately which has had the same crop, fertilizer and lime treatment.
2. Use a soil sampling tube, auger or spade to collect 20 or more equal-sized cores or slices
3. Mix sample thoroughly in a clean bucket (plastic for micro-nutrient) and air dry sample as soon as possible if available nitrogen test is desired.
4. Fill this bag to line with mixture and label plainly.
5. Complete the soil sample information sheet provided by the laboratory.
6. Take samples to your local county Extension office for forwarding to the laboratory.

BACK

SOIL TESTS AVAILABLE

SUPPLEMENTAL INFORMATION SHEET

The various tests available from the soil testing laboratories are described briefly below. Read through the description of each test and mark on the information sheet which tests you desire on your samples.

GENERAL FERTILITY

This test is recommended where crops grow normally, but you desire to know the amount of lime, if any, and the kind and amount of fertilizer needed for optimum plant growth. The test includes determinations for pH, lime requirement on those samples with a pH of 6.4 or less, available phosphorus and exchangeable potassium.

The results of the general fertility test may be supplemented by one or more of the tests listed below. On a majority of the soils in Kansas this test will be adequate.

AVAILABLE PROFILE NITROGEN

This test is recommended on areas which are suspected of having appreciable accumulations of inorganic nitrogen (nitrates plus ammonium). Continuous heavy applications of commercial nitrogen fertilizer and or heavy rates of manure may give accumulations of available nitrogen where yields have not been high proportional to the nitrogen applied. Under summer fallow conditions, appreciable quantities may also accumulate.

Because nitrates are water soluble, movement of the nitrates down in the profile will occur when moisture penetrates into the soil. Thus samples to deeper than plow depth are necessary for a reliable test. In addition to the surface plow layer sample, an additional sample to at least 24 inches is necessary for this test. Deeper samples would be very desirable. Record the depth of sampling on the information sheet. The available nitrogen test will not be made without samples to at least 24 inches. If available nitrogen is desired in addition to the general fertility test, then the surface soil sample plus the subsoil sample must be submitted to the lab. If only available nitrogen is desired, then only one sample to a depth of at least 24 inches is necessary. The samples must be air dried as soon as possible to stop microbial activity. This means spreading the sample on a clean sheet of paper or plastic to dry before sending the sample to the laboratory.

Caution: Be sure the sample is not contaminated by fertilizer dust, manure, salt, etc. Samples should be dry within 24 hours.

AVAILABLE ZINC

This test is recommended on areas under high yield potential for corn or grain sorghum which by erosion, terracing, or leveling for irrigation have had the topsoil removed. Sandy soils low in organic matter under high yield conditions also should be checked for zinc content. Wheat, alfalfa, and pastures are not likely to respond to zinc so this test is not recommended for these crops. Also additional research is needed before zinc is recommended for soybeans or sugar beets.

ORGANIC MATTER

The organic matter in the soil is the storehouse of most of the nitrogen. sulphur, and several of the micronutrients. The rate of release of these nutrients to plant available forms is dependent on environmental conditions. Organic matter results can be very meaningful to agronomists in better understanding the soil conditions on your farm. Organic matter levels can be useful in determining rates of herbicides. This test is not recommended on all samples, but only in cases where the additional information is desired.

LAWN OR GARDEN

This test is a combination of the general fertility and available nitrogen tests made only on a surface soil sample. The results should be very useful in determining the amount of lime and fertilizer to apply for best plant growth.

OTHER TESTS AVAILABLE

The soil testing laboratories also offer tests for salt and alkali, and irrigation water quality. Check with your local county agent on desirability of these tests and instructions for sample collection.

TESTING FEE FOR EACH TEST

General Fertility	$1.50
Available Profile Nitrogen (Two samples-top and subsoil)	2.00
Available Zinc	3.00
Organic Matter	.50
Lawn and Garden	2.00
Salt and Alkali (Three-sample profile-$3 each)	9.00
Irrigation Water Quality	1.00

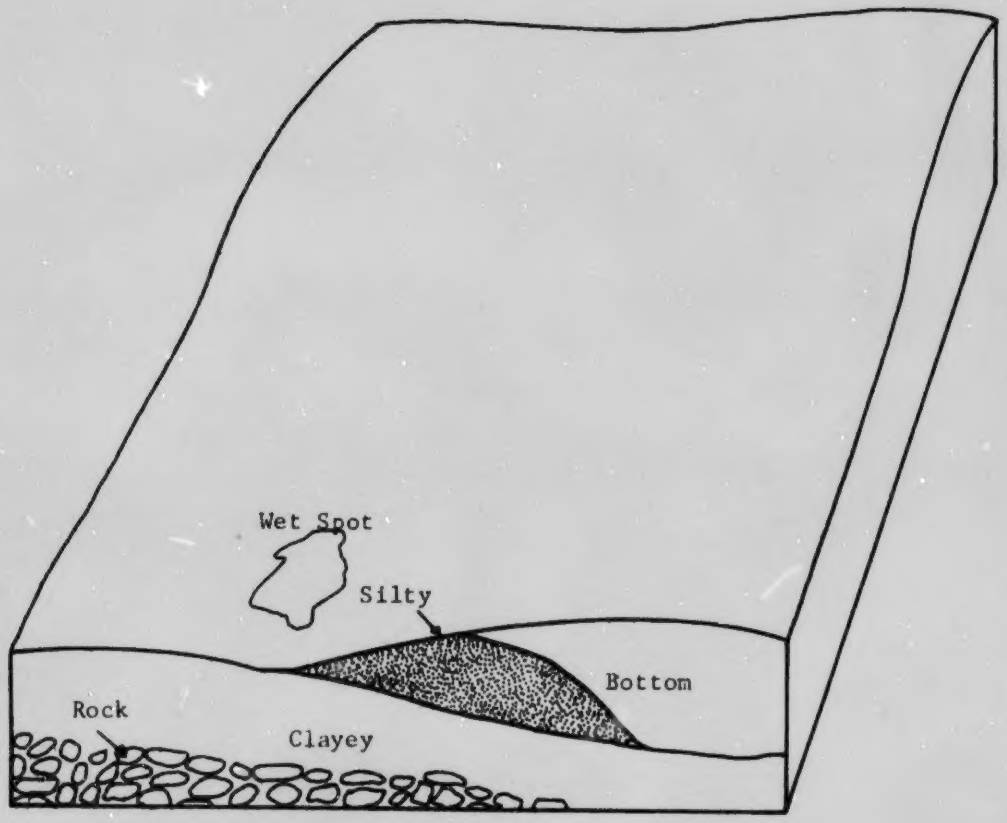
Prices effective January 1, 1970

SOIL SAMPLING
UNIT III

ASSIGNMENT SHEET #1--SELECTING SAMPLING SITES

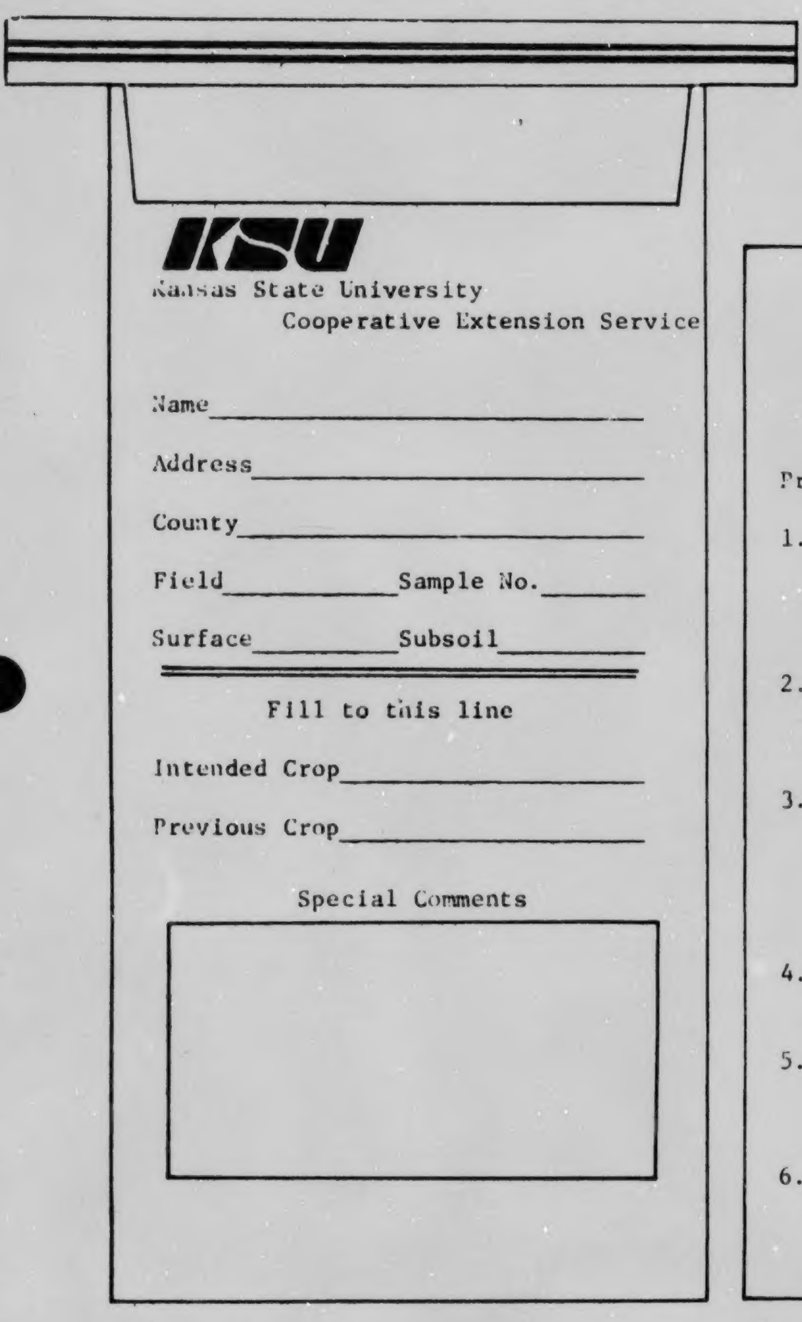
Using the drawing below, complete the following tasks. When completed return to the instructor for his evaluation.

1. Divide a field into sampling areas.
2. Place a small number on each sampling site within one of the divided areas.



SOIL SAMPLING
UNIT III
ASSIGNMENT SHEET #2
SOIL SAMPLE CONTAINER

Collect a soil sample according to directions on this soil sample container.



KSU

Kansas State University
Cooperative Extension Service

Name____________________________

Address__________________________

County___________________________

Field____________Sample No.________

Surface__________Subsoil___________

Fill to this line

Intended Crop_____________________

Previous Crop_____________________

Special Comments

FRONT

Procedure for taking Soil Samples

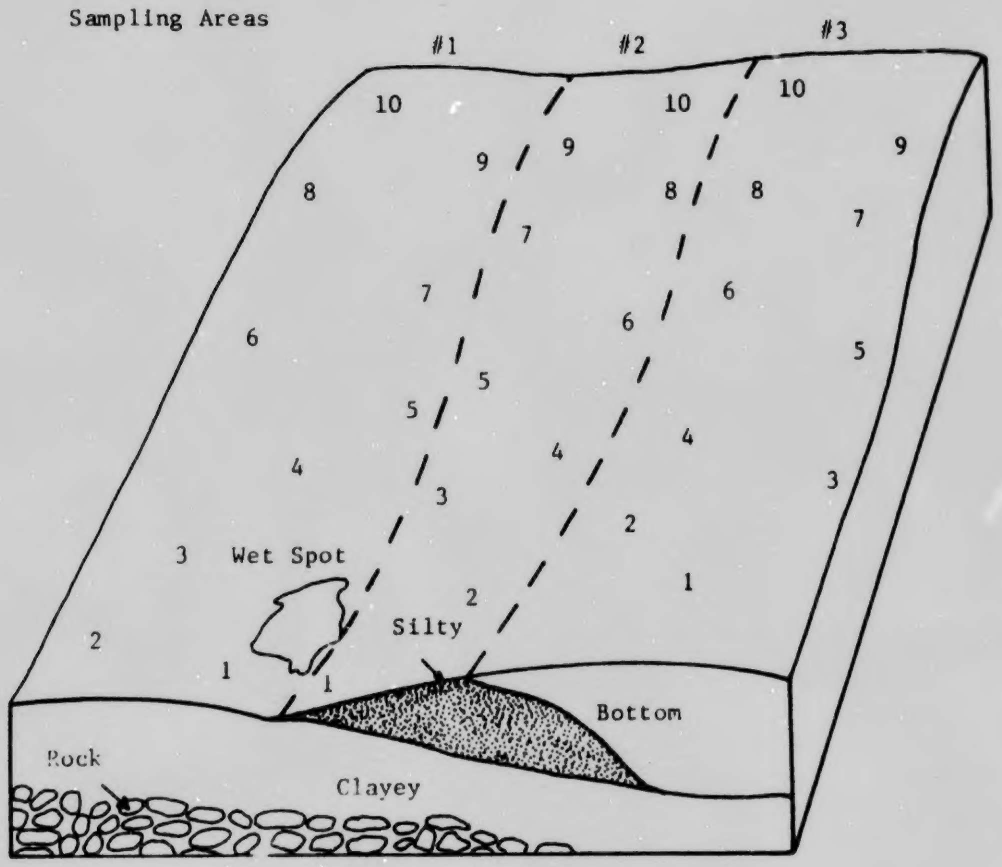
1. Sample each distinctly different soil area separately which has had the same crop, fertilizer and lime treatment.
2. Use a soil sampling tube, auger or spade to collect 20 or more equal-sized cores or slices
3. Mix sample thoroughly in a clean bucket (plastic for micronutrient) and air dry sample as soon as possible if available nitrogen test is desired.
4. Fill this bag to line with mixture and label plainly.
5. Complete the soil sample information sheet provided by the laboratory.
6. Take samples to your local county Extension office for forwarding to the laboratory.

BACK

SOIL SAMPLING
UNIT III

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1


Sampling Areas
#1
#2
#3
10
10
10
9
9
9
8
8
8
7
7
7
6
6
6
5
5
5
4
4
4
3
3
3
2
2
2
1
1
1
Wet Spot
Silty
Bottom
Rock
Clayey

(NOTE: The student is responsible for only one sampling area. The above sampling sites are only suggested but should be representative of the entire sampling area.)

Assignment Sheet #2--Answers will vary with individual students

SOIL SAMPLING
UNIT III

TEST

1. Match the terms on the right to the correct defintion.

_____a. Refers to the degree of acidity or alkalinity of a soil

_____b. Refers to the minimum percentage of nitrogen, available phosphorus, and water soluble potash in a fertilizer

_____c. Any natural or manufactured material added to the soil in order to supply one or more plant nutrients

_____d. Soils having a pH reading of above 7.0

_____e. A chemical means of determining the nutrient supplying power of a soil

_____f. Those soils having a pH reading less than 7.0

_____g. That fraction of soil which results from decomposition of vegetable and animal matter through the action of bacteria

1. Fertilizer
2. Soil pH
3. Organic matter
4. Soil test
5. Acidic soils
6. Alkaline soils
7. Fertilizer analysis

2. Explain in writing two reasons for testing soil.

a.

b.

3. Select from the list below, four major items for which soils are tested. Circle the correct answers.

a. Nitrogen

b. Calcium

c. Zinc

d. Manganese

e. Phosphorus

f. Iron

g. Potassium

4. Place an "X" in the blank to select the procedure to use for collecting a representative soil sample.

_____a. Five to ten samples should be taken in each field or area

_____b. Divide fields to be sampled into uniform areas of not more than sixty acres

_____c. Samples should be taken from the depth of six to eight inches in cropland and pasture land

_____d. Samples of uniform size should be placed in a bucket and mixed

_____e. Approximately one quart of the mixed soil should be placed in a suitable container

5. Select from the list below, areas from which samples should not be taken. Circle the unsuitable sites.

a. Bottom land

b. Fence rows

c. Pasture land

d. Upland

e. Back furrows

f. Eroded spots

g. Acid soils

6. Name five items of information that should be submitted with the soil sample, in order to make proper fertilizer recommendations.

a.

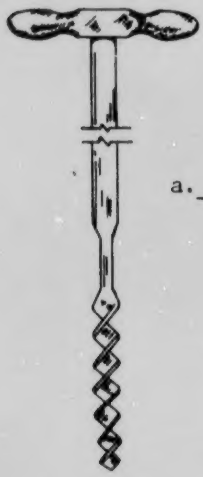
b.

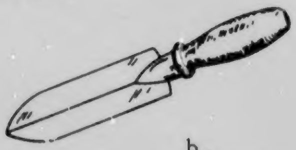
c.

d.

e.

7. Identify four sampling tools.

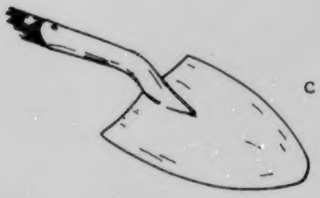




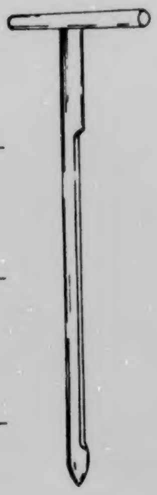
b. ____________________

a. ____________________

d. ____________________



c. ____________________



8. Name two locations in Kansas where soil samples can be sent for testing.

9. Demonstrate the ability to secure a soil sample and prepare it for mailing or processing.

SOIL SAMPLING
UNIT III

ANSWERS TO TEST

1. a. 2

   b. 7

   c. 1

   d. 6

   e. 4

   f. 5

   g. 3

2. Any two of the following:

   a. Estimates how much of a particular nutrient the soil will provide to a crop

   b. Determines the balance of available plant food nutrients

   c. Measures the degree of soil acidity and soil alkalinity.

3. a

   b

   e

   g

4. a

   d

5. b

   e

   f

6. Any five of the following:

   a. Name of county

   b. Name and address of farmer

  - c. Size and location of field
  - d. Fertilizer history
  - e. Cropping history
  - f. Crop to be grown
  - g. Expected yield

7. a. Soil auger
  - b. Trowel
  - c. Spade
  - d. Soil probe

8. Any two of the following
  - a. County Ag Extension Agent.
  - b. Agronomy Department, Kansas State University, Manhattan, Kansas.
  - c. Local Fertilizer Distributor.

9. Performance skills will be evaluated to the satisfaction of the instructor

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

TERMINAL OBJECTIVES

After completion of Unit IV, the student should be able to interpret a soil survey report and understand the uses and benefits from such a report. The student should be able to interpret a legal land description and identify within the state of Kansas any given piece of rural property. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil survey reports and legal land description.
2. Match the system of surveying with the states or areas in which they apply.
3. Label the principal meridians and base lines when drawn on a map of Kansas.
4. Identify the proper section number within the township.
5. Interpret a legal land description by determining the number of acres involved.
6. Identify the exact location of a given piece of rural property using legal description.
7. List procedures used in making a soil survey report.
8. Select from a list six items of information contained in a soil survey report.
9. Select from a list five groups of people that benefit most from soil survey reports.
10. Select, when given a list, the uses a farmer can make of soil survey reports.
11. Demonstrate the ability to follow listed steps in locating information contained in a soil survey report.

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information sheet
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Provide students with assignment sheets
7. Provide a Soil Survey Report for student reference
8. Give test

Student:

1. Read objectives
2. Study information sheet
3. Complete material contained in assignment sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Numbering River Lots and Correction Lots
    - TM 2--A Soil Profile
    - TM 3--Locating Principal Meridians and Base Lines in Kansas
    - TM 4--Numbering Sections Within Township
    - TM 5--Dividing Sections into Smaller Tracts
    - TM 6--Reading a Map
4. Assignment sheets
    - #1--Identifying the Section Number Within a Township
    - #2--Interpreting Number of Acres Involved in Legal Land Descriptions
    - #3--Identifying Rural Property in Kansas
    - #4--Locating Information Within a Soil Survey Report
5. Answers to assignment sheets
6. Test
7. Answers to test

References:

1. Soil Surveys are for Everyone, Extension Bulletin #MF332, Kansas State University.

2. Soil, Extension Bulletin #9, Cooperative Extension Service, North Dakota State University. Fargo, North Dakota.

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

INFORMATION SHEET

I. Terms and definitions

A. Legal description--Exact location of a property

B. Base line--Line running both east and west that extends across lands to be surveyed

C. Standard parallel lines--Run east or west every twenty-four miles parallel to the base line

(NOTE: These lines are numbered consecutively north or south from the base line.)

D. Principal meridian (PM)--Runs both north and south from the initial point and extends across the area to be surveyed

(NOTE: There are twenty-seven principal [illegible] one is used for Kansas Survey which run along the 40 degree parallel.)

E. Guide meridians lines--Run north or south, every twenty-four miles, almost parallel to the principal meridian and are numbered consecutively east or west from the principal meridian

(NOTE: Convergence because of the earth's shape prevents them from being truly parallel and accounts for the correction made on some north and south public roads.)

G. Range (R)--Row or line of north-south townships, six miles apart and numbered consecutively east or west from the principal meridian

H. Section (sec.)--Composed of approximately 640 acres and measures one square mile

(NOTE: North and west tier of sections within a township may be more or less than one square mile, usually less.)

I. Quarter-section (1/4)--Consists of 160 acres

(NOTE: Quarter-section is identified by direction with respect to the section as northeast (NE), southeast (SE), northwest (NW), or southwest (SW).)

(NOTE: Quarter-sections bordering the west and north side of township do not always contain 160 acres.)

INFORMATION SHEET

J. Correction lot--Fractional 40 acre tracts found on the west and north border of a township (Transparency 1)

K. River lot--Fractional 40 acre tracts found along rivers that have a mean high water mark of 132 feet or more (Transparency 1)

(NOTE: The area between the high water mark belongs to the state thus reducing the size to less than a forty acre tract.)

L. Soil survey--Inventory of the soil resources found in a county or area

M. Soil symbol--Manner of identifying soil areas having the same kind of soil

N. Soil association map--Map which gives a broad picture of the distribution of landscapes that have a distinctive pattern of soils that occur together

O. Soil series--Group of soils similar in differentiating characteristics

P. Capability unit--A grouping of soils that shows how suitable soils are for most kinds of farming

Q. Range sites--Kinds of range land that differ from each other in their ability to produce vegetation

R. Engineering classification--Classification of soil properties that are of special interest to engineers

(NOTE: Most important factors are: permeability to water, sheer strength, campaction characteristics, soil drainage, shrink-swell characteristics, texture, plasticity and pH.)

S. Permeability--Ease with which air and water go down into the soil and return toward the surface

T. Soil profile--Vertical section of the soil through all its horizons and extending into the parent material (Transparency 2)

U. Soil horizons--A layer of soil that has distinct characteristics produced by soil-forming processes (Transparency 2)

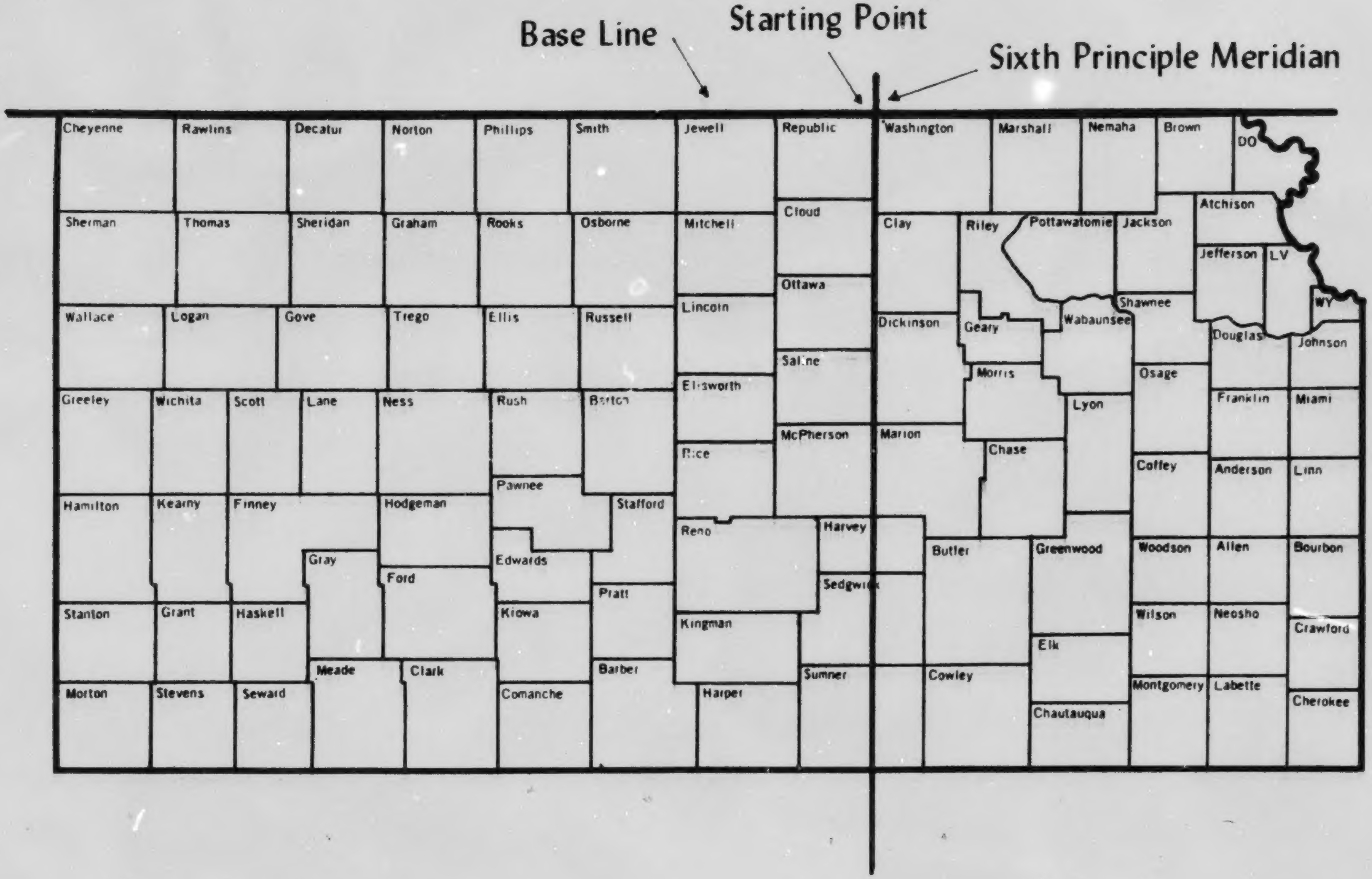
II. Surveying systems used in U.S.

A. Metes-and-bounds--Used by the thirteen original colonies

B. Vara--Used by the state of Texas

C. Rectangular system (U.S. Land Survey System)--Applies primarily to all states except Texas and original thirteen colonies

III. Locating Principal Meridians and Base Line in Kansas


Base Line
Starting Point
Sixth Principle Meridian
Cheyenne
Rawlins
Decatur
Norton
Phillips
Smith
Jewell
Republic
Washington
Marshall
Nemaha
Brown
DO
Sherman
Thomas
Sheridan
Graham
Rooks
Osborne
Mitchell
Cloud
Clay
Riley
Pottawatomie
Jackson
Atchison
Jefferson
LV
Ottawa
WY
Wallace
Logan
Gove
Trego
Ellis
Russell
Lincoln
Dickinson
Geary
Wabaunsee
Shawnee
Douglas
Johnson
Saline
Morris
Osage
Greeley
Wichita
Scott
Lane
Ness
Rush
Barton
Ellsworth
Lyon
Franklin
Miami
McPherson
Marion
Chase
Rice
Coffey
Anderson
Linn
Pawnee
Hamilton
Kearny
Finney
Hodgeman
Stafford
Reno
Harvey
Gray
Edwards
Butler
Greenwood
Woodson
Allen
Bourbon
Ford
Sedgwick
Pratt
Stanton
Grant
Haskell
Kiowa
Kingman
Wilson
Neosho
Crawford
Elk
Meade
Clark
Barber
Sumner
Cowley
Morton
Stevens
Seward
Comanche
Harper
Montgomery
Labette
Cherokee
Chautauqua

INFORMATION SHEET

IV. Procedure for numbering sections within township--Numbering always with 1 in the upper right hand corner and proceeds in a serpentine fashion to the bottom right hand corner of the township to number 36 (Transparency 4)

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

V. Determining number of acres included in legal land description (Transparency 5)

A. Section--Indicates 640 acres

B. Two letters appearing together (SW, NE, NW, or SE) indicates 1/4 of whatever follows

C. One letter (N, S, E, or W) may or may not be followed by 1/2 or 2, always means 1/2 of whatever follows

D. The word "and" means we are beginning the description of another tract

(NOTE: Acreage can quickly be determined by reading the description backward.)

Example: S 1/2 SE 1/4 NW 1/4 Sec. 7 and SE 1/4 SE 1/4 SEC. 7

1. 20 acres referred to in first legal description S 1/2 SE 1/4 NW 1/4 SEC. 7

INFORMATION SHEET

2. 40 acres referred to in last legal description
   SE 1/4 SE 1/4 SEC. 7

VI. Locating rural property within Kansas (Transparency 3)

A. Locate initial or starting point--Point where the sixth principal median intersects with base line is initial point for the state of Kansas.

B. Locate township--Every township is described with reference to the intersection of the principal meridian and the base line (Transparency 6)

1. Each east-west tier of townships is numbered consecutively, north or south from the base line

   Example: Township 2 north (T2N) or township 4 south (T4S)

2. Each range is numbered consecutively east or west from the principal meridian

   Example: Range 2 east (R2E) or range 5 west (R5W)

C. Locate section within township--Numbering begins with 1 in upper right hand corner and proceeds in a serpentine fashion to the bottom right hand corner of township

D. Sections are divided into half sections, quarters, or smaller tracts

VII. Procedures for making soil survey report

A. Soil scientist studies area to be mapped acre by acre

B. Profiles are compared with other soil profiles in the area and other areas

C. Soils that have profiles almost alike make up soil series

(NOTE: Soil series is named for town or other geographic feature where first mapping occurred.)

D. Soil series having different textures are divided into soil types

E. Soil types are further divided into soil phases

F. Boundaries of the individual soils are drawn on aerial photographs

G. Data yields of crops are assembled from farm records and from field or plot experiments

INFORMATION SHEET

- H. Soils are grouped as to suitability for each specified use

VIII. Information contained in soil surveys

- A. History of area surveyed
- B. Climate of area
- C. Type of agriculture in area
- D. Geology, relief and drainage of soil
- E. Soil association map
- F. Soil series description
- G. Interpretations--Refers to response and behavior of soils to various kinds of management
- H. Other soils data--This includes soil type, horizon color, permeability, percent slope, and many other factors

IX. Groups that benefit from soil survey reports

- A. Farmers, ranchers, and farm managers
- B. Banks, land appraisers, and tax assessors
- C. Vocational agriculture teachers and county extension agents
- D. Wildlife and recreational departments
- E. Planning boards, health officials, and municipal officials
- F. Engineers (highway and others)
- G. Soil conservation service
- H. Agriculture Stabilization and Conservation Service

X. Uses farmer can make of soil survey reports

- A. Aids in determining management and treatment practices
- B. Provides information pertaining to yields of principal crops
- C. Provides recommended grass and tree species for a given soil area
- D. Contains tables giving irrigation ratings, limitations, and management problems for each soil

INFORMATION SHEET

E. Includes basic soil characteristics that are converted into eight land capability classes

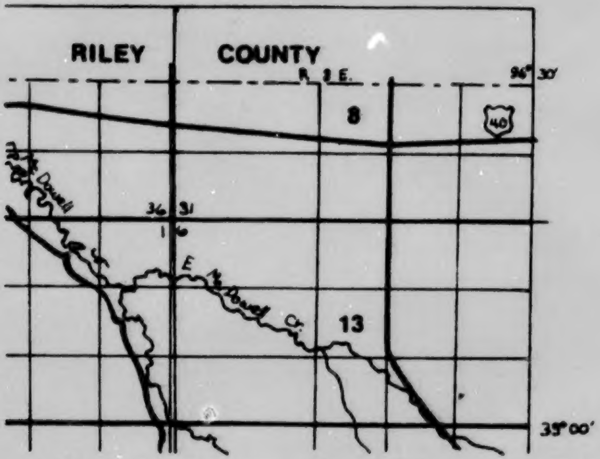
F. Useful for determining building site

G. Useful in determining the location of septic tank

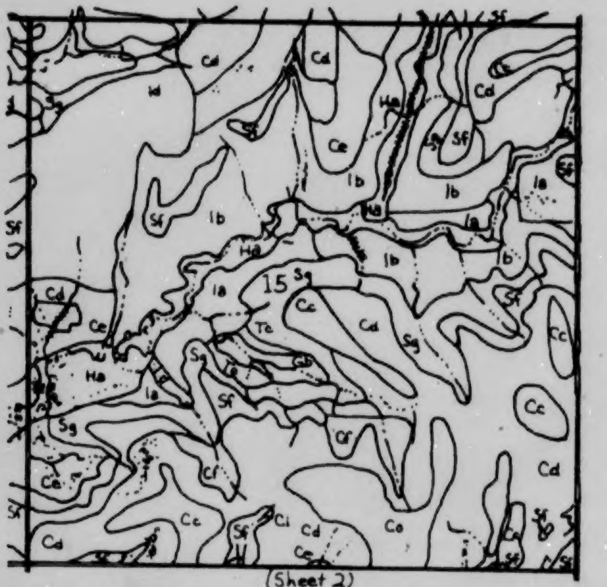
XI. Locating information found in soil survey report

A. Refer to index maps sheets page in the back of report

Example:


RILEY
COUNTY
R. 8 E.
96° 30'
8
40
36
31
1
6
E. McDowell Cr.
13
35°00'

B. From the sheet number showing your farm area, determine the map symbols occuring on your farm.


Cd
Id
Sg
Ha
Sf
Ce
Ib
Ia
15
Cc
Tc
Gb
Cf
Ci
Co
A

(Sheet 2)

INFORMATION SHEET

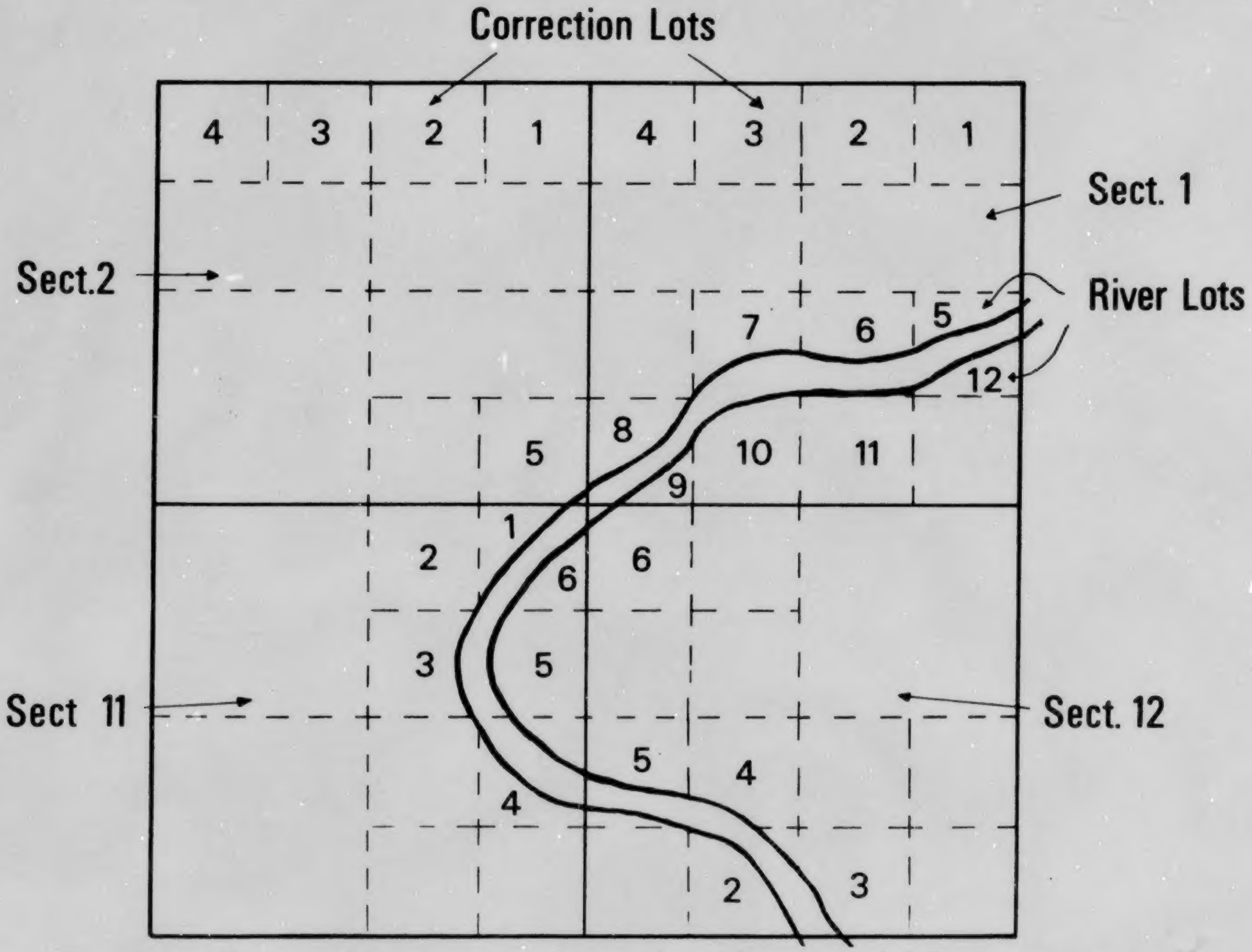
C. Refer to the Guide to Mapping Units, Capability Units, and Range Sites to find page numbers where the soils are described

(NOTE: These pages give needed references helpful in locating recommendations for managing soils under cropland, range, woodland, and windbreak conditions.)

SOILS LEGEND

SYMBOL	NAME
Ca	Cass fine sandy loam
Cb	Cass loam
Cc	Crete silty clay loam, 0-1 percent slopes
Cd	Crete silty clay loam, 1-4 percent slopes
Ce	Crete silty clay loam, 4-8 percent slopes
Cf	Crete soils, severely eroded
Da	Derby loamy sand
Db	Dwight silty clay loam
Fa	Farnum fine sandy loam, 0-1 percent slopes
Fb	Farnum fine sandy loam, 1-4 percent slopes
Fc	Florence cherty clay loam
Ga	Geary silt loam, 4-8 percent slopes
Gb	Geary silt loam, 8-12 percent slopes
Gc	Geary soils, severely eroded
Ha	Hobbs silt loam
Hb	Humbarger clay loam and loam
Hc	Humbarger loamy fine sand
Ia2	Irwin silty clay loam, 0-1 percent slopes
Ia	Irwin silty clay loam, 1-4 percent slopes
Ib	Irwin silty clay loam, 4-8 percent slopes
Ic	Irwin silty clay loam, 8-12 percent slopes
Id	Irwin soils, severely eroded
La	Ladysmith silty clay loam, 0-1 percent slopes
Lb	Ladysmith silty clay loam, 1-4 percent slopes
Ma	Monona silt loam
Mb	Muir loam
Mc	Muir silty clay loam
Ra	Riverwash
Sa	Sand dunes, Sarpy material
Sb	Sarpy loamy fine sand
Sc	Shellabarger sandy loam, 1-4 percent slopes
Sd	Shellabarger sandy loam, 4-8 percent slopes
Se	Shellabarger sandy loam, 8-20 percent slopes
Sf	Sogn rocky clay loam
Sg	Sogn complex
Sh	Solomon silty clay
Sm	Sutphen clay, moderately deep over sand
Sn	Sutphen silty clay
Tb	Tully silty clay loam, 1-4 percent slopes
Tc	Tully silty clay loam, 4-8 percent slopes
Td	Tully silty clay loam, 8-20 percent slopes
Te	Tully soils, severely eroded
Wa	Hastings silty clay loam, 0-1 percent slopes
Wb	Hastings silty clay loam, 1-4 percent slopes
Wc	Hastings silty clay loam, 4-8 percent slopes
Wd	Hastings silty clay loam, 8-12 percent slopes
We	Hastings soil, severely eroded

Numbering River Lots and Correction Lots

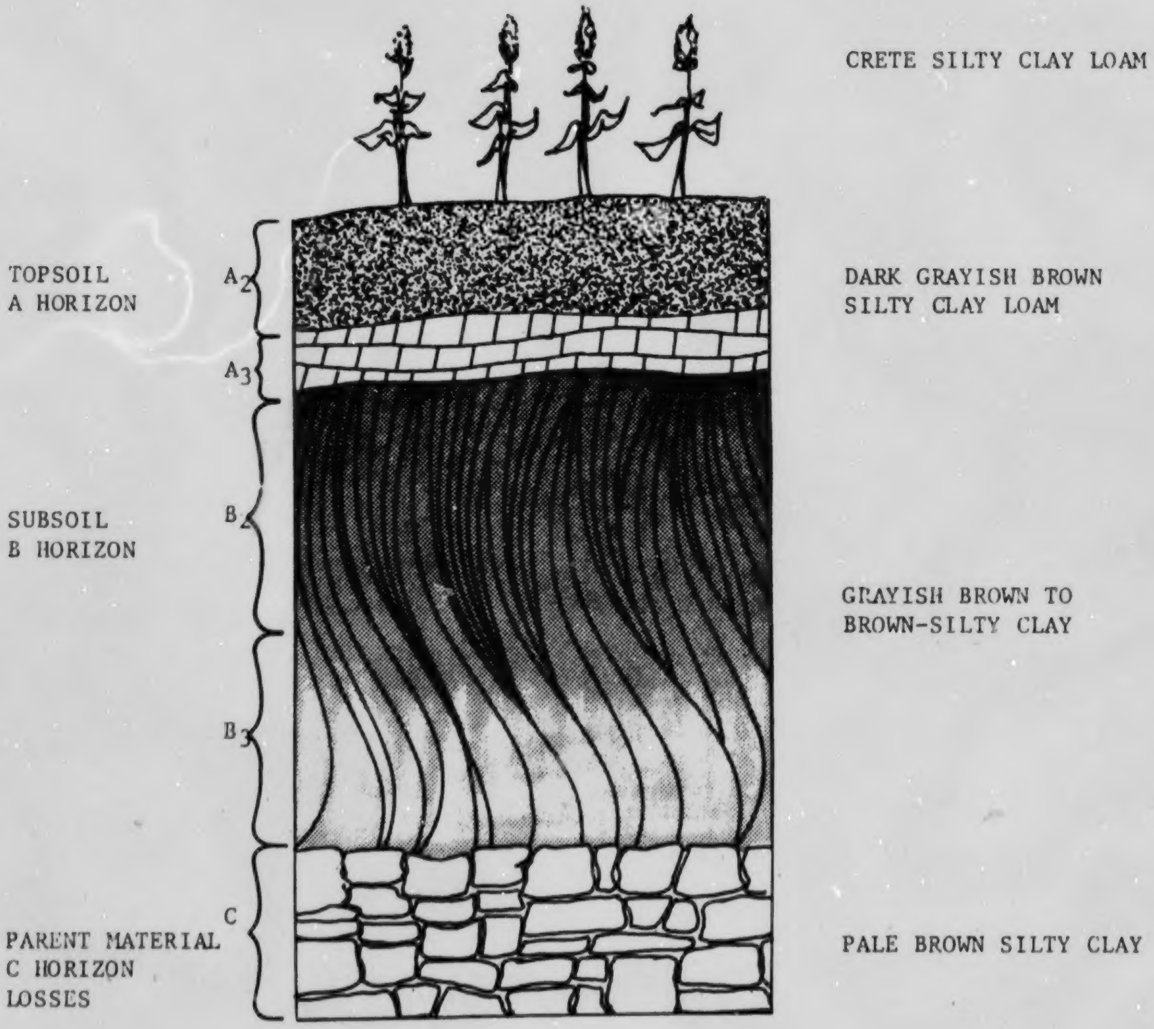

Correction Lots
4
3
2
1
4
3
2
1
Sect. 1
Sect.2
River Lots
7
6
5
12
8
5
10
11
9
1
2
6
6
3
5
Sect 11
Sect. 12
5
4
4
2
3

Lot numbers usually run downstream to section Line then back upstream to line.

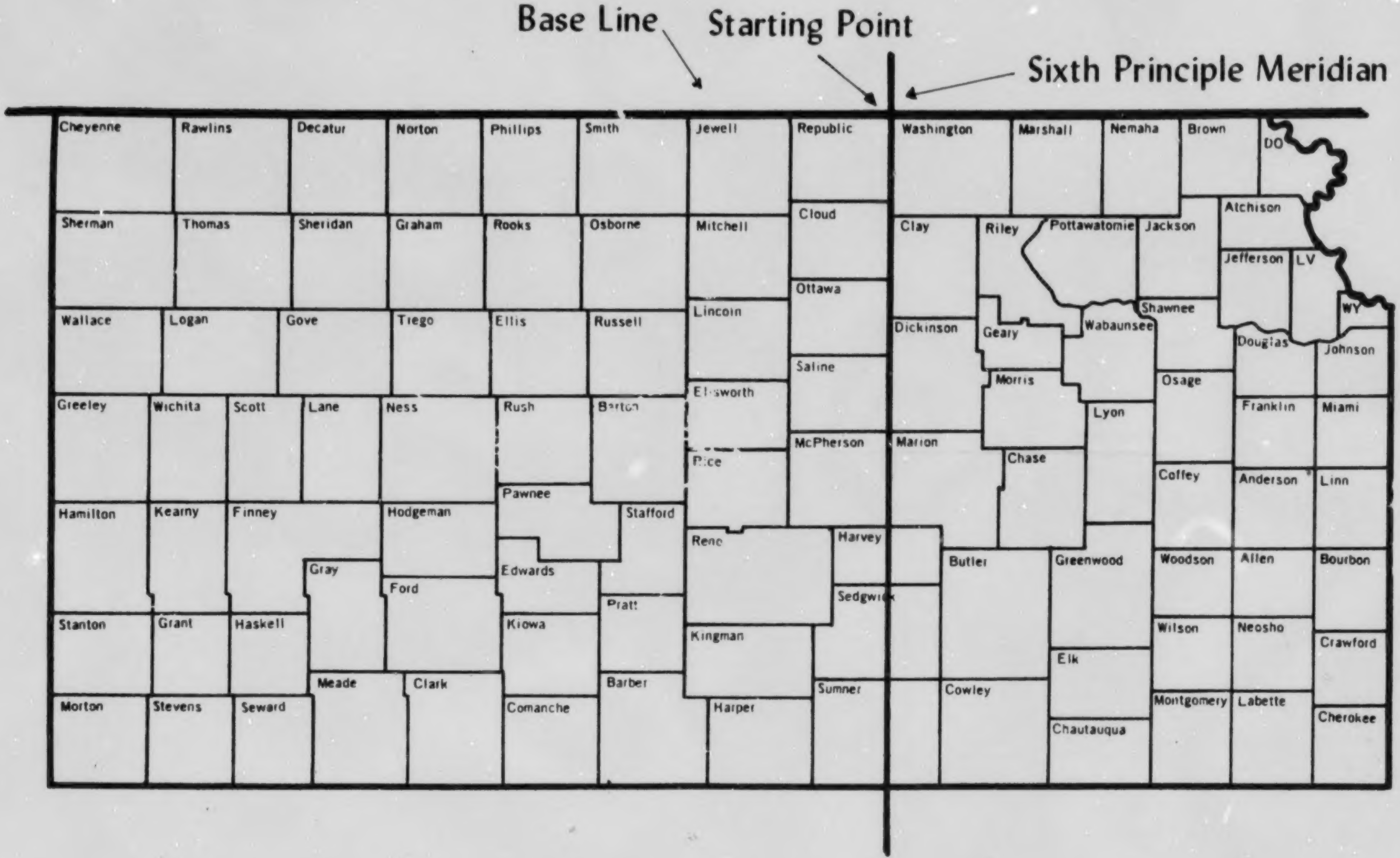
TM 1

Ag. IV - 109-C

SOIL PROFILE


CRETE SILTY CLAY LOAM
TOPSOIL
A HORIZON
A_2
DARK GRAYISH BROWN
SILTY CLAY LOAM
A_3
SUBSOIL
B HORIZON
B_2
GRAYISH BROWN TO
BROWN-SILTY CLAY
B_3
C
PARENT MATERIAL
C HORIZON
LOSSES
PALE BROWN SILTY CLAY

LOCATING PRINCIPAL MERIDIANS AND BASE LINE IN KANSAS


Base Line
Starting Point
Sixth Principle Meridian
Cheyenne
Rawlins
Decatur
Norton
Phillips
Smith
Jewell
Republic
Washington
Marshall
Nemaha
Brown
DO
Sherman
Thomas
Sheridan
Graham
Rooks
Osborne
Mitchell
Cloud
Clay
Riley
Pottawatomie
Jackson
Atchison
Jefferson
LV
Ottawa
Wallace
Logan
Gove
Trego
Ellis
Russell
Lincoln
Dickinson
Geary
Wabaunsee
Shawnee
WY
Douglas
Johnson
Saline
Morris
Osage
Greeley
Wichita
Scott
Lane
Ness
Rush
Barton
Ellsworth
Lyon
Franklin
Miami
McPherson
Marion
Rice
Chase
Coffey
Anderson
Linn
Pawnee
Hamilton
Kearny
Finney
Hodgeman
Stafford
Reno
Harvey
Butler
Greenwood
Woodson
Allen
Bourbon
Gray
Ford
Edwards
Sedgwick
Pratt
Stanton
Grant
Haskell
Kiowa
Kingman
Wilson
Neosho
Crawford
Elk
Meade
Clark
Barber
Sumner
Cowley
Morton
Stevens
Seward
Comanche
Harper
Montgomery
Labette
Cherokee
Chautauqua

Ag. IV - 113-C

TM 3

Numbering Sections Within Township

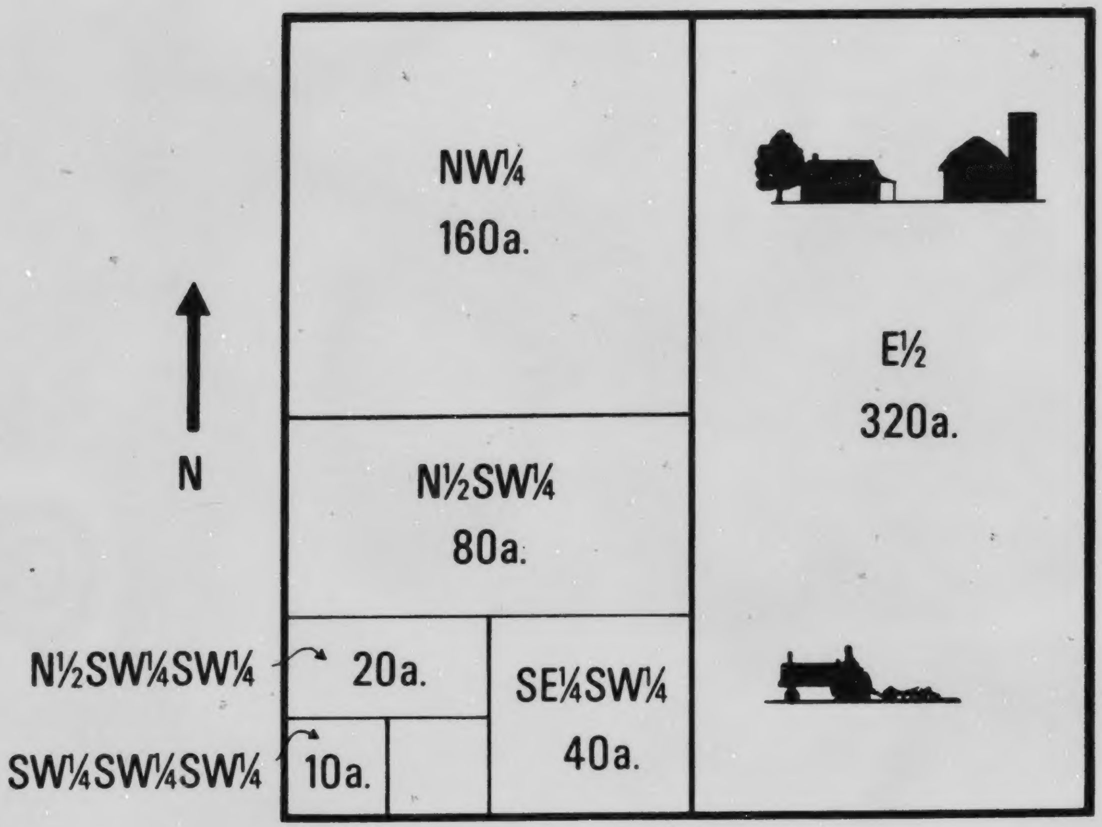
↑

N

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

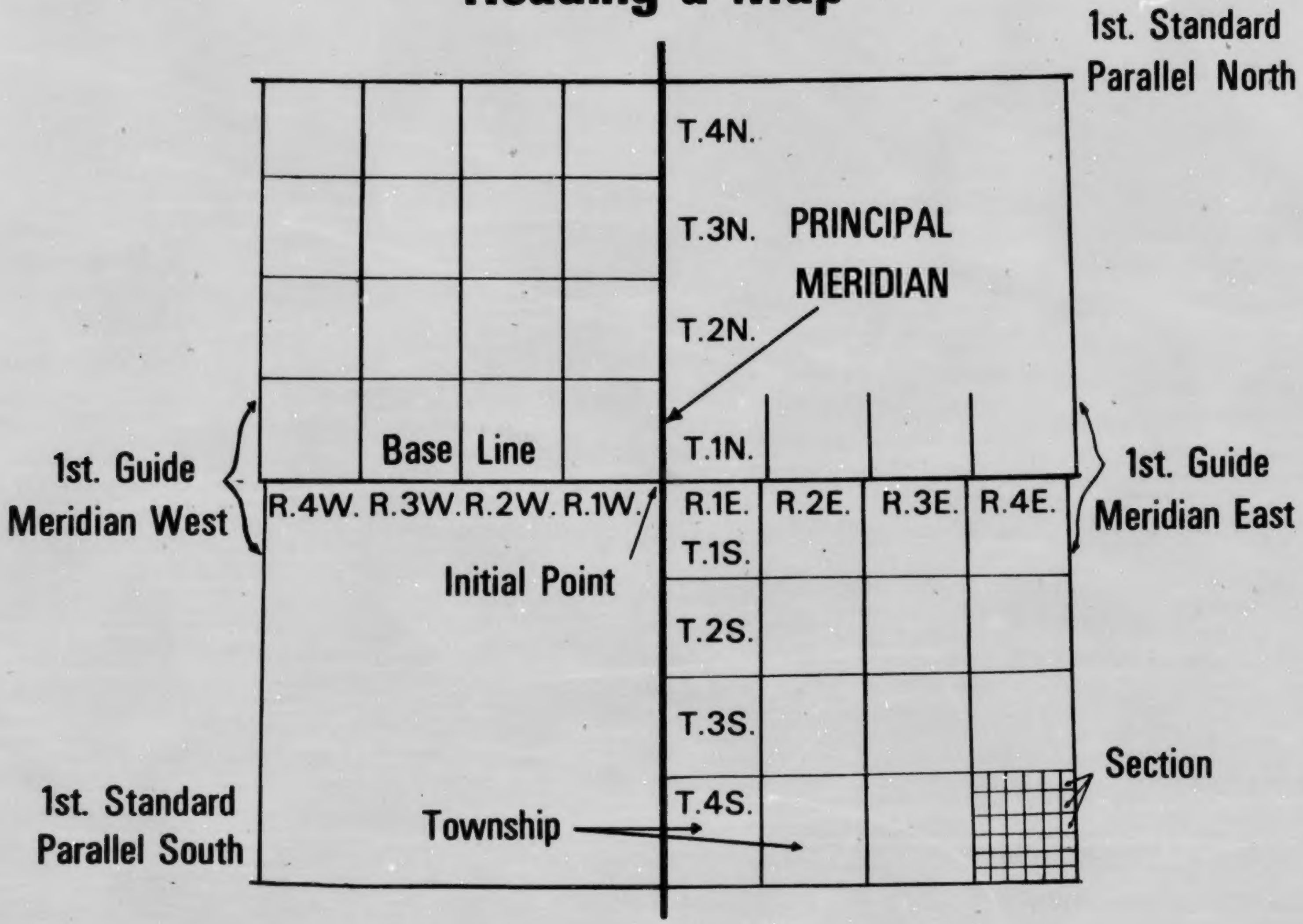
Townships are divided into 36 one-mile-square sections.

Dividing Sections into Smaller Tracts


NW¼
160a.
E½
320a.
N
N½SW¼
80a.
N½SW¼SW¼
20a.
SE¼SW¼
40a.
SW¼SW¼SW¼
10a.

Sections of land are divided into quarters or smaller tracts.

Reading a Map

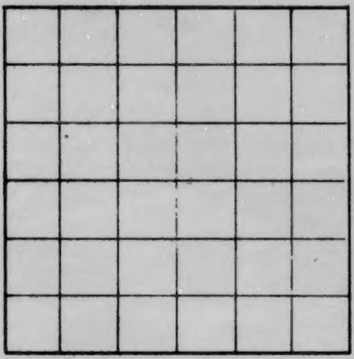

1st. Standard
Parallel North
T.4N.
T.3N.
PRINCIPAL
MERIDIAN
T.2N.
T.1N.
Base Line
1st. Guide
Meridian West
1st. Guide
Meridian East
R.4W.
R.3W.
R.2W.
R.1W.
R.1E.
R.2E.
R.3E.
R.4E.
T.1S.
Initial Point
T.2S.
T.3S.
Section
T.4S.
1st. Standard
Parallel South
Township

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

ASSIGNMENT SHEET #1--IDENTIFYING THE SECTION NUMBER WITHIN A TOWNSHIP

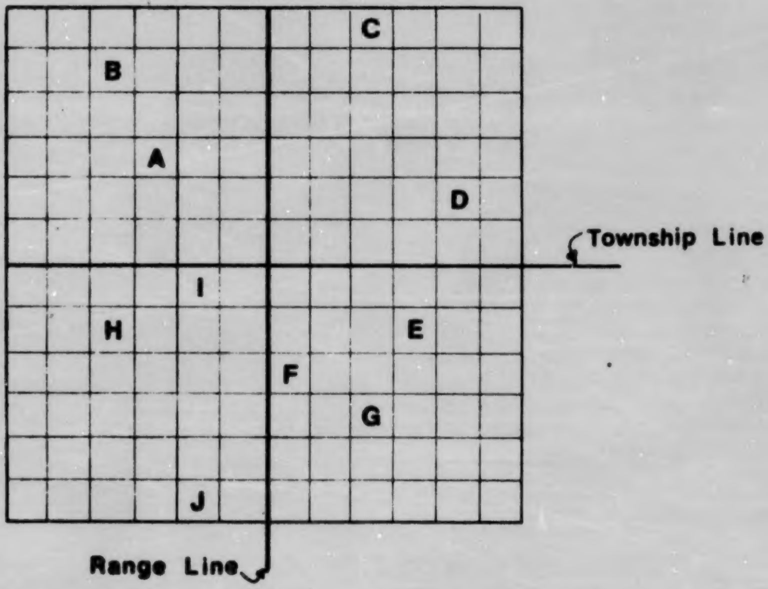
Answer the following problems relating to the numbering of sections

1. Number the sections within the township drawn below.



2. Using the illustration below, list the section number of:

A_____ **B**_____ **C**_____ **D**_____ **E**_____ **F**_____ **G**_____
H_____ **I**_____ **J**_____


C
B
A
D
Township Line
I
H
E
F
G
J
Range Line

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

ASSIGNMENT SHEET #2--INTERPRETING NUMBER OF ACRES INVOLVED IN LEGAL LAND DESCRIPTIONS

Solve the following problems:

1. How many acres are in the following described tracts?

   a. NW 1/4 and S 1/2 SEC. 11______________

   b. N 1/2 N 1/2 SW 1/4 and S 2 Ne 1/4 of SEC. 10______________

   c. SE 1/4 and SE 1/4 SW 1/4 SEC. 12 and N 1/2 N 1/2 S 1/2 SEC. 13______________

   d. S 15 acres of N 2 NW 1/4 NW 1/4 and S 1/2 NW 1/4 NW 1/4 SEC. 8 acres______________

2. Describe in legal terms the fractional parts of the below drawing.

   a.______________________________

   b.______________________________

   c.______________________________

   d.______________________________

   e.______________________________

   f.______________________________

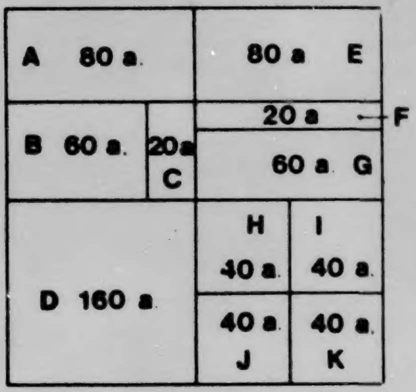
   g.______________________________

   h.______________________________

   i.______________________________

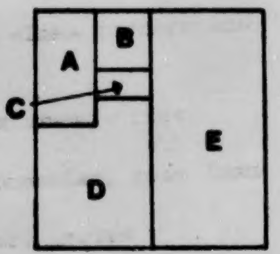
   j.______________________________

   k.______________________________


A 80 a.
80 a E
20 a
F
B 60 a.
20a
C
60 a. G
H
I
40 a.
40 a.
D 160 a.
40 a.
40 a.
J
K

ASSIGNMENT SHEET #2

3. Give the legal description and acreage in the following tracts in SEC. 21 T16N R 14W IM



a. Description

Acres

b. Description

Acres

c. Description

Acres

d. Description

Acres

e. Description

Acres

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

ASSIGNMENT SHEET #3--IDENTIFYING PROPERTY IN KANSAS

Using the enclosed map, answer the following questions:

1. According to the map, who owns or what is located on the following property?

    a. SEC. 27 T9S R7E 6th PM __________

    b. SEC. 11 T9S R6E 6th PM __________

    c. SEC. 8 T9S R7E 6th PM __________

    d. SEC. 24 T10S R6E 6th PM __________

2. Using the map, what is the legal description for the following listed names?

    a. Manhattan Airport __________ __________ __________

    b. Wyman Park __________ __________ __________

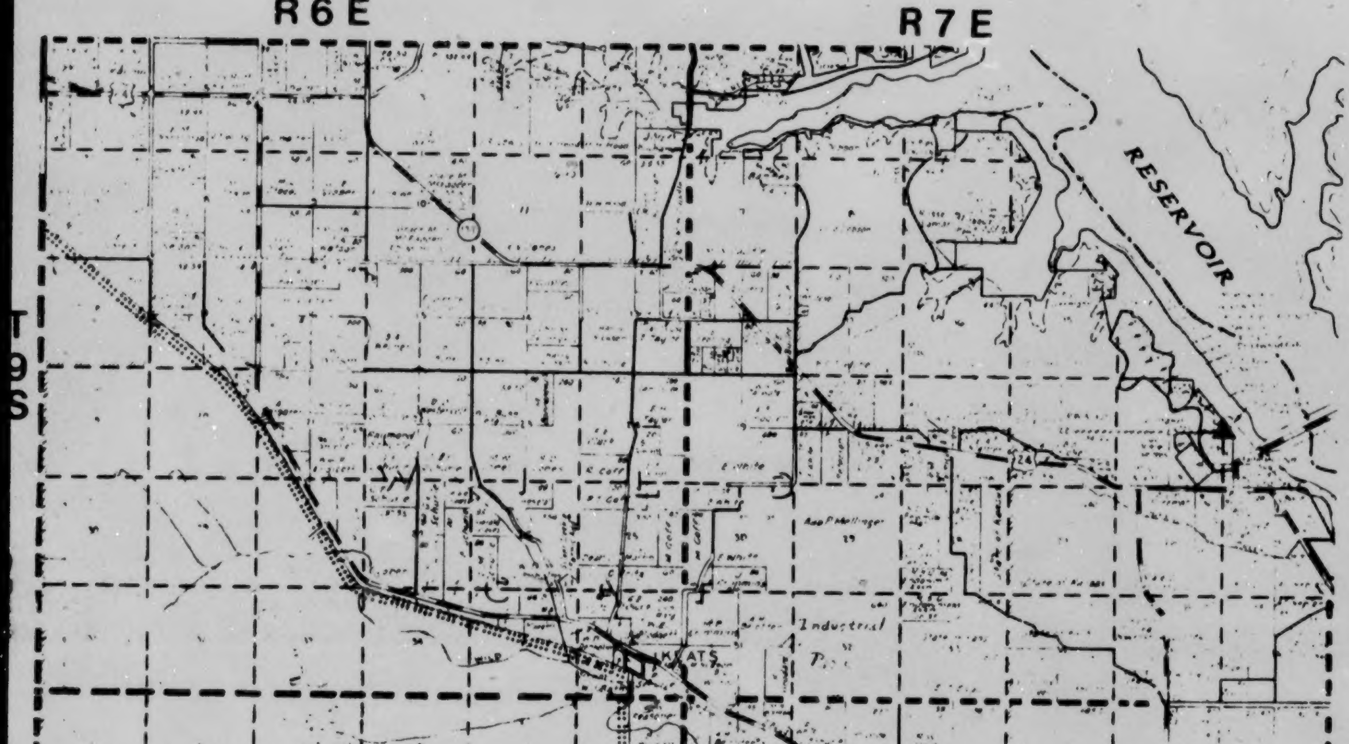
    c. Industrial Park __________ __________ __________

    d. Military Cemetary __________ __________ __________

3. Approximately how many miles east of the 6th Principal Meridian is the town of Manhattan?

4. Approximately how far south from the base line is the Explosive Testing Range?

ASSIGNMENT SHEET #3


R6E
R7E
T 9 S
T 10 S
RESERVOIR
KEATS
Industrial Park
Manhattan
Wyman Park

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT IV

ASSIGNMENT SHEET #4--LOCATING INFORMATION WITHIN A SOIL SURVEY REPORT

Using the work sheet provided and your county soil survey report, complete the information relating to one soil found on your farm or a given farm.

(NOTE: In event your county has no soil survey report, copies of County survey reports may be obtained from your soil conservation service.)

ASSIGNMENT SHEET #4

County ______________ Legal Description of Farm ______________

Map Symbol	Soil Name	Land Slope	Soil Profile (surface soil, subsoil, substratum or parent material)	Depth of Root Zone	Permeability	Crop Yields	Capability Unit	Engr. Class.	Range Site
Dn B	Dennis Silt Loam	1-3%	A1 - 0-14" Silt Loam B1 - 4" Light Silty Clay B2 - 11" Clay Loam C - 13" Heavy Clay Loam Parent Material - Sandy & Clayey Shale	42"	Moderate	Wheat - 30 bu. Corn - 42 bu. Alfalfa - 2 ton	IIe-2	A1-ML-A-4 B1-ML-A-4 B2-$\genfrac{}{}{0pt}{}{\mathrm{ML}}{\mathrm{CL}} >$ A7 C-$\genfrac{}{}{0pt}{}{\mathrm{ML}}{\mathrm{CL}} >$ A7	Loamy Prairie

——— EXAMPLE ———

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTIONS
UNIT IV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1.

↑ N

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

2. a. 22
   b. 9
   c. 4
   d. 26
   e. 10
   f. 18
   g. 21
   h. 9
   i. 2
   j. 35

Assignment Sheet #2

1. a. 480
   b. 120
   c. 280
   d. 35
   e. 20

2. a. N 1/2 NW 1/4
   b. SW 1/4 NW 1/4 and W 1/2 SE 1/4 NW 1/4
   c. E 1/2 SE 1/4 NW 1/4
   d. SW 1/4
   e. N 1/2 NE 1/4
   f. N 1/2 N 1/2 S 1/2 NE 1/4
   g. S 1/2 S 1/2 NE 1/4 and S 1/2 N 1/2 S 1/2 NE 1/4
   h. NW 1/4 SE 1/4
   i. NE 1/4 SE 1/4
   j. SW 1/4 SE 1/4
   k. SE 1/4 SE 1/4
3. a. W 1/2 NW 1/4 SEC. 21 T16N R14W IM--80 acres
   b. NE 1/4 NW 1/4 SEC. 21 T16N R14W IM--40 acres
   c. N1/2 SE 1/4 NW 1/4 SEC. 21 T16N R14W IM--20 acres
   d. SW 1/4 and S 1/2 SE 1/4 NW 1/4 SEC. 21 T16N R14W IM--180 acres
   e. E 1/2 SEC. 21 T16N R14W IM--320 acres

Assignment Sheet #3

1. a. State of Kansas
   b. C.V. Jones
   c. Lula Dobson
   d. J.K. Smith Memorial
2. a. SEC. 32 T10S R7E 6th PM
   b. SEC. 27 T10S R6E 6th PM
   c. SEC. 32 T9S R7E 6th PM
   d. SEC. 8 T10S R6E 6th PM
3. 6 miles per range x 7RE = 42 miles
4. 6 miles per township x 10TS = 60 miles

Assignment Sheet #4--Evaluated to the satisfaction of the instructor

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT III

TEST

1. Match the terms on the right to the correct definition.

_____a. Runs both north and south from the initial point and extends across area to be surveyed

_____b. A division of territory six miles long on its south, east, and west boundaries and is slightly less than six miles on the north, which accounts for the correction lines located every six miles on the base line and on the standard parallel

_____c. Run north or south, every twenty-four miles almost parallel to the principal meridian and are numbered consecutively east or west from the principal meridian

_____d. Exact location of a property

_____e. Line running both east and west that extends across lands to be surveyed

_____f. Run east or west every twenty-four miles parallel to the base line

_____g. Row or line of north-south townships six miles apart and numbered consecutively east or west from the principal meridian

_____h. Consists of 160 acres

1. Soil profile
2. Engineering classification
3. Soil symbol
4. Base line
5. Township
6. Capability unit
7. Soil series
8. Range
9. Soil association map
10. Legal description
11. Principal meridian
12. Permeability
13. Range sites
14. Soil survey
15. Correction lot
16. Section
17. Standard parallel lines
18. Guide meridian lines
19. Quarter section
20. River lot
21. Soil horizons

_____i. Composed of approximately 640 acres and measures one square mile

_____j. Fractional 40 acre tracts found on the west and north border of a township

_____k. Fractional 40 acre tracts found along rivers that have a mean high water mark of 132 feet or more

_____l. Manner of identifying soil areas having the same kind of soil

_____m. Inventory of the soil resources found in a county or area

_____n. Map which gives a broad picture of the distribution of landscapes that have a distinctive pattern of soils that occur together

_____o. Grouping of soils that shows how suitable soils are for most kinds of farming

_____p. Group of soils similar in differentiating characteristics

_____q. Classification of soil properties that are of special interest to engineers

_____r. Kinds of range land that differ from each other in their ability to produce vegetation

_____s. Ease with which air and water go down into the soil and return toward the surface _____t. A layer of soil that has distinct characteristics produced by soil-forming processes

_____u. Vertical section of the soil through all its horizons and extending into the parent material

2. Match the system of surveying with the states or areas in which they apply.

_____a. Vara

_____b. Metes-and-bounds

_____c. Rectangular system

1. Applies primarily to all states except Texas and the original thirteen colonies

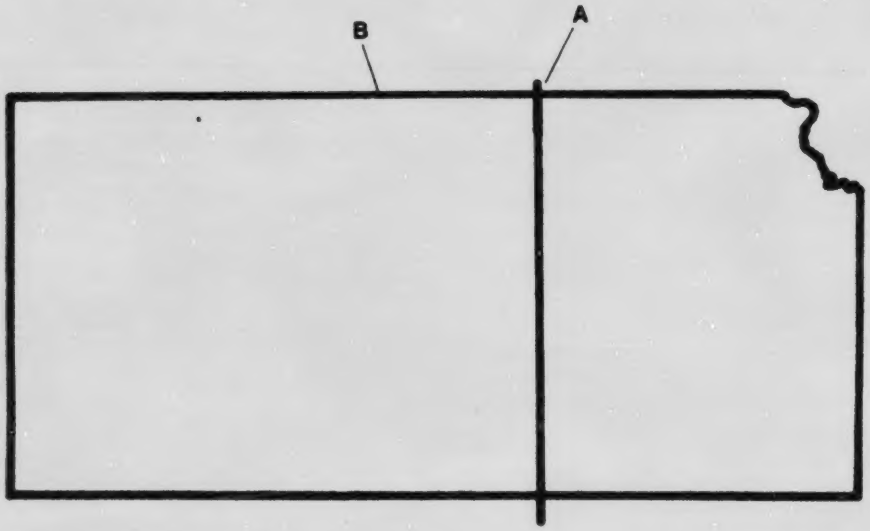
2. Used by the state of Texas

3. Used by the thirteen original colonies

3. Label the principal meridian and base line on the map below.

a.

b.



4. Using the illustration below, identify the proper section number within the township.

   a.

   b.

   c.

   d.

			A		
B					
			C		
					D

5. Interpret the following legal land description by determining the number of acres involved. N 1/2 SE 1/4 NE 1/4 SEC. 7 and SE 1/4 SEC. 7

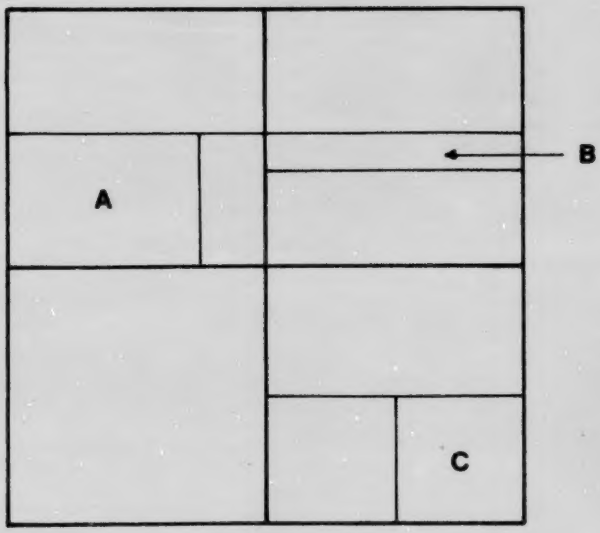
Total Acres:____________

6. Identify the exact location of the property listed in the section below. Use legal descriptive terms.

   a.

   b.

   c.



7. List four procedures used in making a soil survey report.

8. Select from the list below six items of information contained in a soil survey report. Place an "X" by the correct answer.

_____a. Soil association map

_____b. Soil series description

_____c. Geology, relief and drainage of soil

_____d. Suggested building sites

_____e. Climate of area

_____f. Fertilizer recommendations

_____g. Type of agriculture in area

_____h. History of area surveyed

_____i. Crop yields for each farm

9. Select the five groups of people that benefit most from soil survey reports. Place an "X" by correct answers.

_____a. Farmers, ranchers, and farm managers

_____b. School superintendent

_____c. Engineers (highway and others)

_____d. Planning boards, health officials, and municipal officials

_____e. Insurance companies

_____f. County clerk

_____g. Banks, land appraisers, and tax assessors

_____h. Wildlife and recreational departments

10. Select from the enclosed list, four uses a farmer can make of soil survey reports. Place an "X" by the proper answers.

_____a. Aid in determining management and treatment practices

_____b. Useful for determining building sites

_____c. Useful reference for training land judging teams

_____d. Provides information pertaining to yields of principal crops

_____e. Contains tables showing fertilizer recommendations

_____f. Useful in determining the location of septic tank

11. Demonstrate the ability to follow listed steps in locating information contained in a soil survey report.

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION
UNIT III

ANSWERS TO TEST

1. a. 11
   b. 5
   c. 18
   d. 10
   e. 4
   f. 17
   g. 8
   h. 19
   i. 16
   j. 15
   k. 20
   l. 3
   m. 14
   n. 9
   o. 6
   p. 7
   q. 2
   r. 13
   s. 12
   t. 21
   u. 1
2. a. 2
   b. 3
   c. 1

3. a. Principal

   b. Base Line

4. a. 3

   b. 7

   c. 22

   d. 36

5. 180

6. a. SW1/4 NW 1/4 and W 1/2 SE 1/4 NW 1/4 of SEC.

   b. N 1/2 N 1/2 S 1/2 NE 1/4 of SEC.

   c. SE 1/4 SE 1/4 of SEC.

7. Any four of the following:

   a. Soil scientist studies area to be mapped acre by acre

   b. Profiles are compared with soil profiles in the area and other areas

   c. Soils that have profiles almost alike make up soil series

   d. Soil series having different textures are divided into soil types

   e. Soil types are further divided into soil phases

   f. Boundaries of the individual soils are drawn on aerial photographs

   g. Data on yields of crops are assembled from farm records and from field or plot experiments

   h. Soils are grouped as to suitability for each specified use

8. a

   b

   c

   e

   g

   h

9. a

   c

   d

   g

   h

10. a

    b

    d

    f

11. Performance skills will be evaluated to the satisfaction of the instructor.

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

TERMINAL OBJECTIVES

After completion of Unit V, the student should be able to match terms associated with Conservation Districts and the Soil Conservation Service and distinguish between the responsibilities of a Conservation District and the Soil Conservation Service. He should be able to select from a list the assignments made to the Soil Conservation Service by Congress and the Secretary of Agriculture. The student should be able to select from a list the occupational opportunities available in the Soil Conservation Service and explain in writing how the student trainee program works. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with Conservation Districts and Soil Conservation Service.
2. Distinguish between the responsibilities of a Conservation District and the Soil Conservation Service.
3. Explain in writing how Conservation Districts are organized and managed.
4. Identify the six conservation areas within the state of Kansas.
5. Select from a list the assignments made to the Soil Conservation Service by Congress and the Secretary of Agriculture.
6. List the benefits that land users derive from the Soil Conservation Service.
7. Select from a list the occupational opportunities available in the Soil Conservation Service.
8. Explain in writing how the Soil Conservation Service Student Trainee Program works.
9. Complete a survey indicating the names of district directors and types of services available through the Soil Conservation Service and Conservation Districts.

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Arrange for a Soil Conservation Service employee to visit class and explain present work plans for district.
7. Contact local Conservation District or Soil Conservation Service and secure a resource conservation plan.
8. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet and turn in to instructor
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Organizational Chart
    - TM 2--Kansas Conservation Areas and Districts
4. Assignment Sheet
    - #1--How the Soil Conservation Service and Conservation District Serve My Family
5. Test
6. Answers to test

References:

1. Assistance available from the Soil Conservation Service, USDA Bulletin No. 345, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, 1970.

2. Careers in Soil Conservation Service. USDA Miscellaneous Publication No. 717. Washington, D.C.: U.S. Government Printing Office, 1971.

3. Students, Start Your Career in Soil Conservation Service Before Graduate. USDA Publication No. 714, Washington, D.C.: U.S. Government Printing Office, 1966.

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

INFORMATION SHEET

I. Terms and definitions

A. Conservation District--A legal subdivision of the state, organized under the Conservation District Law enacted in 1937 and as later amended

(NOTE: Conservation Districts are responsible for carrying out a program of conservation of our natural resources of lands within the district boundaries.)

B. Soil Conservation Service--Agency of the U.S. Department of Agriculture which is one of the principle sources of federal government assistance to Conservation Districts

(NOTE: By the will of Congress and by direction of the Secretary of Agriculture, the primary function of the Soil Conservation Service is to give technical help--through districts--to individuals, groups, and communities who make decisions about the conservation development and use of natural resources.)

C. Long-range program--Program that identifies present and future needs and opportunities for the conservation and development of natural resources within the district

D. Annual work plan--Outlines the current year's steps to be taken toward the goals and objectives of the long range plan

(NOTE: This is the district's plan and not that of the Soil Conservation Service or any other public agency. Once developed the district work plan makes it possible for the Soil Conservation Service to develop its own annual plan of operations and thus properly plan for its assistance to the district.)

II. Conservation District and Soil Conservation Service responsibilities

A. Conservation District

1. Furnishing effective local leadership in the form of a properly constituted governing body
2. Holding regular and special meetings to plan work and to determine community needs for conservation and resource development
3. Developing a long-range program that recognizes the interests of all the people in the district and is compatible with the area or regional development plans.

INFORMATION SHEET

4. Developing, with help from the Soil Conservation Service and other agencies, an annual work plan related to the long-range program which states what will be needed to reach objectives and accomplish work scheduled for the year ahead

5. Enlisting needed assistance from whatever source is available

6. Coordinating the several conservation and resource development programs which may operate within the district

7. Determining priorities for Soil Conservation Service and other assistance to individuals, public bodies, private organizations, and other district cooperators

8. Supervising employees of the district

9. Managing all funds, facilities, and equipment belonging to the district; Soil Conservation Service employees will not engage in these activities

10. Cooperating with other districts and governmental units in multi-district resource activities such as comprehensive and functional planning, watershed development, river basin programs, and other resource development projects

11. Correlation of district programs with those of other agencies engaged in resource planning and development such as planning commissions, economic development districts, sanitary commissions, conservation commissions, and others

12. Reporting to the public on resource conservation needs and progress and the work of the district

13. Following up with cooperators to insure effectiveness of the program

B. Soil Conservation Service

1. Furnishing qualified technical help, as available, on the basis of needs outlined by the district

2. Locating its staff, insofar as possible, at headquarters mutually satisfactory to the district and Soil Conservation Service and providing such facilities as its employees may require

3. Gathering and providing soil survey, water management, and other resource data and interpretations for use by the district and others in making plans and decisions

INFORMATION SHEET

4. Developing a workload analysis for an annual plan of operations for its own staff, after review of the district annual work plan

5. Keeping the district governing body informed about Soil Conservation Service work in the district and any new developments that would affect the district program or alter the assistance available from the Soil Conservation Service

6. Supervising and managing Soil Conservation Service personnel, equipment, and facilities made available to the district by Soil Conservation Service

7. Cooperating with other resource agencies assisting the district

8. Assisting the district with information and education activities in the community, area, and state

9. Helping the district meet demands from local governments and others seeking technical help on land use and related resource needs and opportunities

   (NOTE: The Conservation Districts and Soil Conservation Service work together as partners--each looks to the others for assistance and guidance in meeting the needs in soil, water, and related resource conservation and in providing effective technical assistance to landowners and operator's who make the final decisions on land use and conservation treatment to be applied.)

III. Organization and management of Conservation Districts (Transparency 1)

   A. Districts are organized under state law by local people

   B. Districts are managed by an elected and unsalaried board made up of local citizens

   C. Each district is legally responsible under state law for soil and water conservation work within its boundaries

   (NOTE: Districts operate under the guidance of a state commission, board or committee elected by the district supervisors.)

IV. Conservation Areas and Districts (Transparency 2)

   A. Conservation Areas

      1. State is divided into (6) areas for the purpose of selecting the members to the State Conservation Commission.

INFORMATION SHEET

2. The commission's goal is to assist the conservation districts in the promotion, development, and administration of conservation programs in Kansas.

3. The state Conservation Commission members are elected by supervisors from the (5) Conservation Districts for two year terms.

B. Conservation Districts

1. State is divided into (5) districts for the purpose of establishing programs and plans of work, based on conservation needs and problems.

2. Districts request and receive technical assistance from the Soil Conservation Service in carrying out their program.

3. Each district is governed by a five man board of supervisors, three are elected by land occupiers of the district and two are appointed by the State Conservation Commission.

V. Soil Conservation Service assignments from Congress and Secretary of Agriculture

A. Develops and carries out a national soil and water conservation program through conservation districts

B. Helps develop and carry out watershed protection and flood prevention projects

C. Administers the Great Plans Conservation Program

D. Helps local sponsors develop and carry out multicounty resource conservation and development projects

E. Has primary responsibility for the national cooperative soil survey

F. Heads the National Inventory of Soil and Water Conservation Needs Committee

G. Makes and coordinates snow surveys for water forecasting in the West

H. Helps establish income-producing recreation areas on privately owned land and public recreation areas

I. Gives technical assistance to land users participating in the conservation-credit program of the Farmers Home Administration

J. Gives technical assistance to all land owners including non-farming and urban groups

INFORMATION SHEET

VI. How Soil Conservation Service benefits land users

A. Develops a soil and land-capability map of the land unit, a range-site and range-condition map of rangeland, and a woodland-suitability map of woodlands

B. Compiles information about the different uses and adaptation of crops (including grasses, trees, and wildlife) for each kind of soil

C. Assembles information about conservation measures needed on each kind of soil for each of the different safe uses

D. Gives onsite assistance to the individual in making a conservation plan for his land unit

E. Gives technical assistance in designing, laying out, and checking the construction and maintenance of dams, terraces, or other structures

F. Gives technical assistance in selecting plant varieties, seeding methods and rates, and in solving problems that arise in managing pastures, woodlands, or wildlife habitat

G. Services are extended to nonfarm rural land users as well as to urban land users

VII. Occupational opportunities of the Soil Conservation Service

A. Conservation technician

(NOTE: Helps professional conservationists prepare conservation farm plans. Helps land users establish measures called for in conservation plans.)

Qualifications--Experience in conservation farming; farm or ranch background required for most positions. Vocational Agriculture training will normally be sufficient for the qualifications.

B. Engineering technician

(NOTE: Helps engineers with surveys, plotting notes, engineering computations, drafting, layout work in the field, and inspection of construction operations.)

Qualifications--Experience on survey crews running levels and transits; work on construction, layout, and inspection. Vocational Agricultural training is highly desirable.

INFORMATION SHEET

C. Soil Conservationist

(NOTE: Helps local people in rural and rural-fringe areas prepare conservation development plans for communities and individual operating units to meet local needs. Gives onsite technical assistance in carrying out planned conservation improvements.

Qualifications--A college degree with major study in soil conservation or a closely related natural resource or agricultural field. Specified courses are listed in the examination announcement.)

D. Soil Scientist

(NOTE: Collects information about the soil through examination and records the information on maps and as field notes which are published later. Presents the information for use by farmers and ranchers, urban planners, and technical specialists in other fields.)

Qualifications--A college degree with major study in soil science or closely related field of study. Specified courses are listed in the examination announcement.)

E. Engineer

(NOTE: Plans, designs, and supervises construction of: earth fill and reinforced-concrete dams for flood prevention, water supply, wildlife, and water-based recreation; streambank-protection and channel-stabilization work; chutes, drops, spillways, diversions, waterways, and terraces for erosion control and water conservation; and irrigation and drainage systems. Makes hydrologic studies and prepares soil mechanics reports on foundation and earth embankment materials.)

Qualifications--College degree in engineering with major emphasis on hydraulics, hydrology, structural design, drainage, or irrigation.)

F. Range conservationist

(NOTE: Helps ranchers and other range users to determine the potential of their land for producing forage from native plant communities for livestock, wildlife, and recreation and to prepare conservation plans to improve the condition of their range. Gives onsite technical assistance in range [illegible], proper forage utilization, reseeding, brush control, water development, systems of grazing, and ecosystem management.

Qualifications--College degree with major study in range management or range conservation. Specified courses are listed in the examination announcement.)

INFORMATION SHEET

G. Economist

(NOTE: Participates in planning watersheds, river basins, and resource conservation and development areas. Estimates benefits, allocates costs, and determines economic justification of plans for flood prevention, irrigation, drainage, municipal and industrial water supply, recreation, and other types of resource development projects. Collects and analyzes data on economic growth indicators and uses economic projections in evaluating water and related land resource planning. Collects cost-and-return data for conservation measures.

Qualifications--A college degree with major study in economics. Specified courses are listed in the examination announcement.)

H. Woodland conservationist

(NOTE: Gives technical guidance, training, and other assistance in woodland conservation to Soil Conservation Service employees and soil and water conservation district cooperators. Develops specifications for woodland practices in collaboration with forestry agencies. Soil Conservation Service employees use this information in providing assistance to land users in conserving their woodlands as part of coordinated soil and water conservation programs. Interprets forestry techniques and experimental data for field use. Helps to evaluate soil-tree relationships and determine woodland conservation practices in relation to specific soil or site conditions.

Qualifications--A college degree with major study in forestry. Specified courses are listed in the examination announcement.)

I. Agronomist

(NOTE: Provides technical guidance on agronomic problems to Soil Conservation Service employees, and to land owners and operators who are carrying out soil and crop experimental data for field use of Soil Conservation Service personnel, and to land owners and operators who are planning and applying conservation plans. Conducts field trials to evaluate adaptability and handling of grasses and legumes useful in soil and water conservation. Determines methods of establishing herbaceous vegetation for soil and water conservation purposes.

Qualifications--A college degree with major study in agronomy or a closely related field. Specified courses are listed in the examination announcement.)

J. Biologist

(NOTE: Provides guidance and training to Soil Conservation Service employees in biological principles and practices that make cropland, grazing land, woodland, and farm or ranch water more productive of fish and wildlife. Develops biological practices and standards, converts new knowledge into technical recommendations, and assembles and makes available other information relating to fish and wildlife

INFORMATION SHEET

for the use of Soil Conservation Service employees and land owners and operators.

Qualifications--A college degree with at least thirty semester hours in biological science. Specified courses are listed in the examination announcement.)

K. Geologist

(NOTE: Investigates and interprets surface and subsurface conditions in relation to: planning, designing, and constructing engineering structures; ground water-supply, management, and recharge; sediment-yield, sources, damage, and control.

Qualifications--A college degree with major in geology. Specified courses are listed in the examination announcement.)

L. Plant materials specialist

(NOTE: Brings together plants from many sources for conservation uses. Tests and evaluates these plants to determine adaptation, erosion control, and soil improving values. Determines the cultural requirements and the management practices necessary for success. Increases and field tests selected plants for such specialized uses as pond margins, ground cover, forage, sand dunes, wind barriers, wildlife food and shelter, and turfs and screens on land used for recreation.

Qualifications--A college degree with a major in agronomy, range conservation, or other plant science.)

VIII. How Soil Conservation Service student Trainee Program works

A. Program designed for college freshmen, sophomores, or juniors that are majoring in Agriculture

B. Students qualify in a civil service examination

C. The Soil Conservation Service hires student to work during nonschool periods at GS-3 after completing one year in college

D. Student works each summer during the vacation period, goes on leave from the job in the fall, and returns to college

E. Between sophomore and junior year, the student will be eligible for promotion to GS-4

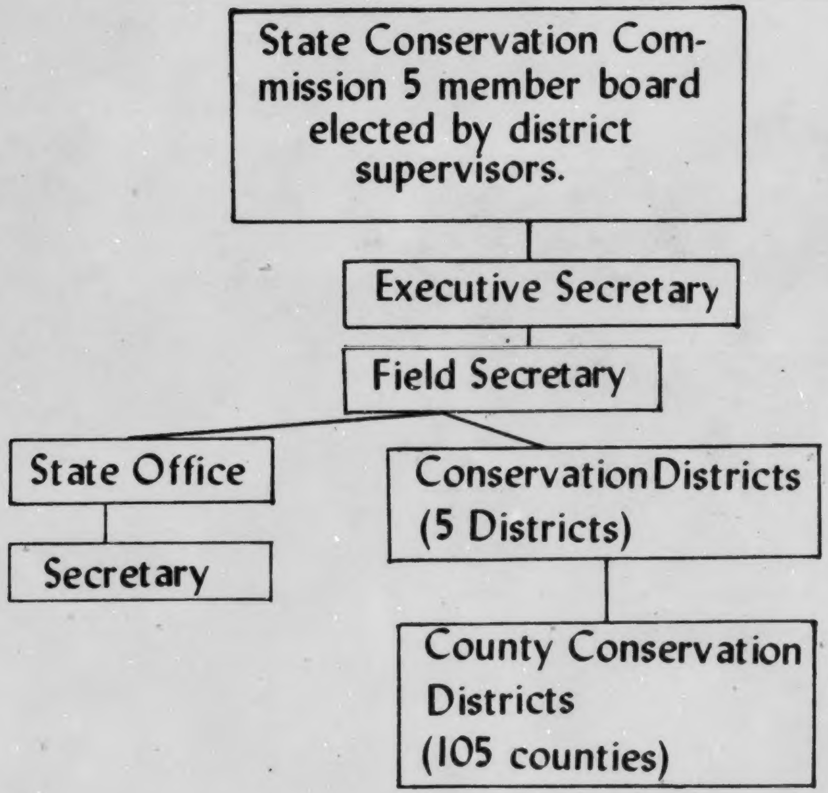
F. Between junior and senior year, student is eligible for promotion to GS-5

INFORMATION SHEET

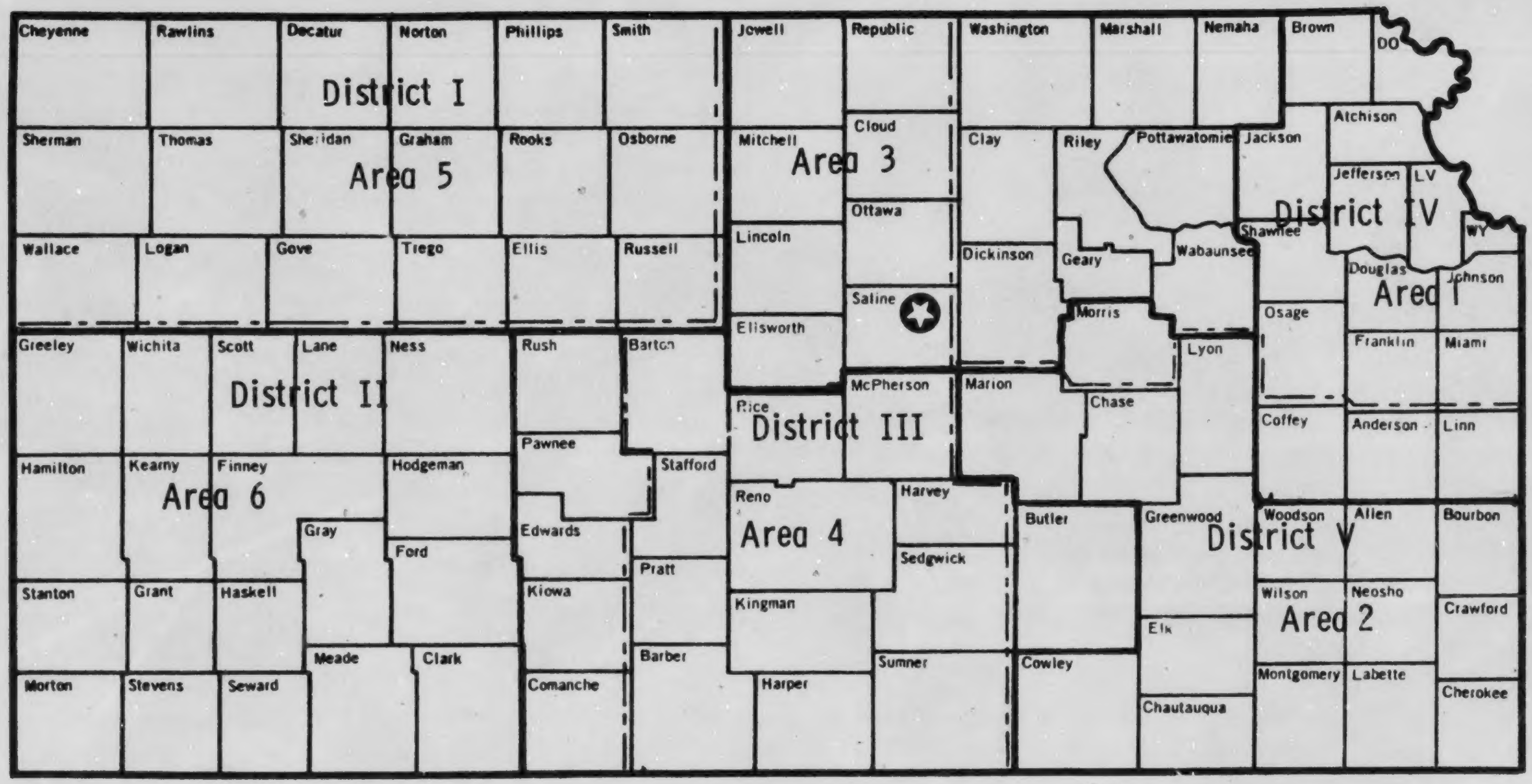
G. Upon successful completion of work assignment and graduation and without further civil service examination, student is assigned to a full-time professional job

(NOTE: Soil Conservation Service offers a student creative, challenging outdoor work, on-the-job training by recognized authorities in the science of soil and water conservation, and an opportunity to gain broad experience in all phases of soil and water conservation or to specialize in one technical field.)

Organizational Chart


State Conservation Commission 5 member board elected by district supervisors.
Executive Secretary
Field Secretary
State Office
Secretary
Conservation Districts (5 Districts)
County Conservation Districts (105 counties)

KANSAS CONSERVATION AREAS AND DISTRICTS


District I
Area 5
District II
Area 6
Area 3
District III
Area 4
District IV
Area 1
District V
Area 2
Cheyenne
Rawlins
Decatur
Norton
Phillips
Smith
Jewell
Republic
Washington
Marshall
Nemaha
Brown
DO
Sherman
Thomas
Sheridan
Graham
Rooks
Osborne
Mitchell
Cloud
Clay
Riley
Pottawatomie
Jackson
Atchison
Jefferson
LV
Wallace
Logan
Gove
Trego
Ellis
Russell
Lincoln
Ottawa
Dickinson
Geary
Wabaunsee
Shawnee
WY
Douglas
Johnson
Saline
Ellsworth
Morris
Osage
Lyon
Franklin
Miami
Greeley
Wichita
Scott
Lane
Ness
Rush
Barton
Rice
McPherson
Marion
Chase
Coffey
Anderson
Linn
Pawnee
Stafford
Hamilton
Kearny
Finney
Hodgeman
Reno
Harvey
Butler
Greenwood
Woodson
Allen
Bourbon
Gray
Ford
Edwards
Sedgwick
Pratt
Stanton
Grant
Haskell
Kiowa
Kingman
Wilson
Neosho
Crawford
Elk
Meade
Clark
Barber
Sumner
Cowley
Montgomery
Labette
Cherokee
Morton
Stevens
Seward
Comanche
Harper
Chautauqua

Area Boundary and Number

Conservation Districts Boundary and Number

County Conservation Districts

State Office Salina

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

ASSIGNMENT SHEET #1--HOW THE SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICT SERVE MY FAMILY

Complete the following survey either by visiting a Soil Conservation Service office or listing a Soil Conservation Service employee that has visited your class.

1. Identify your Conservation District.

2. Name the five district directors in your Conservation District and list their occupations

   a.

   b.

   c.

   d.

   e.

3. How has the Soil Conservation Service and the Conservation District served your family in the past?

ASSIGNMENT SHEET #1

4. In what ways could the Soil Conservation Service and Conservation District be of service to you and your family in the future.

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

TEST

1. Match the terms on the right to the proper definition.

_____a. Program that identifies present and future needs and opportunities for the conservation and development of natural resources within the district

_____b. A legal subdivision of the state, organized under the Conservation District Law enacted in 1937 and as later amended

_____c. Agency of the U.S. Department of Agriculture which is one of the principle sources of federal government assistance to Conservation Districts

_____d. Outlines the current year's steps to be taken toward the goals and objectives of the long-range plan

1. Conservation District
2. Soil Conservation Service
3. Long-range program
4. Annual work plan

2. Place "D" by the responsibilities of a Soil Conservation District and "S" by the responsibilities of the Soil Conservation Service.

_____a. Furnishing effective local leadership in the form of a properly constituted governing body

_____b. Developing a workload analysis for an annual plan of operations for its own staff, after review of the district annual work plan

_____c. Gathering and providing soil survey, water management, and other resource data and interpretations for use by the district and others in making plans and decisions

_____d. Developing a long-range program that recognizes the interests of all the people in the district and is compatible with the area or regional development plans

_____e. Cooperating with other districts and governmental units in multi-district resource activities such as comprehensive and functional planning, watershed development, river basin programs, and other resource development, river basin programs, and other resource development projects _____f. Holding regular and special meetings to plan work and to determine community needs for conservation and resource development

_____g. Locating its staff, insofar as possible, at headquarters mutually satisfactory to the district and Soil Conservation Service and providing such facilities as its employees may require

_____h. Following up with cooperators to insure effectiveness of the program

_____i. Supervising and managing Soil Conservation Service personnel, equipment, and facilities made available to the district by Soil Conservation Service

_____j. Assisting the district with information and education activities in the community, area, and state

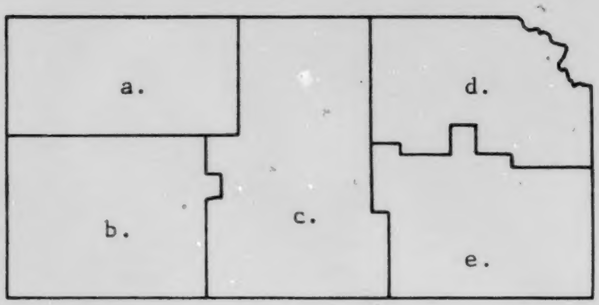
_____k. Reporting to the public on resource conservation needs and progress and the work of the district

_____l. Furnishing qualified technical help, as available, on the basis of needs outlined by the district

3. Explain in writing how Conservation Districts are organized and managed.

4. Identify the five conservation districts in Kansas.

a. District #_____
b. District #_____
c. District #_____
d. District #_____
e. District #_____



5. Select from the list below the assignments made to Soil Conservation Service by Congress and Secretary of Agriculture by the correct functions.

_____a. Helps local sponsors develop and carry out multicounty resource conservation and development projects

_____b. Assists the counties in making soil surveys _____c. Administers the Great Plans Conservation program

_____d. Develops and carries out a county soil and water conservation program through conservation areas

_____e. Heads the National Inventory of Soil and Water Conservation Needs Committee

_____f. Makes and coordinates rainfall and temperature surveys for weather forecasting in the West

_____g. Helps establish income-producing recreation areas on privately owned land and public recreation areas

_____h. Gives technical assistance to all land owners including nonfarming and urban groups

6. List three benefits that land users derive from the Soil Conservation Service.

   a.

   b.

   c.

7. Select from the list below the occupational opportunities available in the Soil Conservation Service. Place an "X" by the correct answers.

_____a. Engineering technician

_____b. Agronomist

_____c. Plant materials specialists

_____d. Entomologist

_____e. Range conservationist

_____f. Conservation technician

_____g. Animal scientist

_____h. Woodland conservationist

_____i. Soil conservationist

8. Explain in writing how the Soil Conservation Service Student Trainee Program works.

9. Complete a survey indicating the names of district directors and types of services available through the Soil Conservation Service and Conservation Districts.

   (NOTE: This activity should be completed prior to this test.)

SOIL CONSERVATION SERVICE AND CONSERVATION DISTRICTS
UNIT V

ANSWERS TO TEST

1. a. 3
   b. 1
   c. 2
   d. 4
2. a. D
   b. S
   c. S
   d. D
   e. D
   f. D
   g. S
   h. D
   i. S
   j. S
   k. D
   l. S
3. Conservation districts are organized by local people. They are managed by an elected and unsalaried board made up of local citizens. Each district is legally responsible for soil and water conservation work within its boundaries.
4. a. I
   b. II
   c. III
   d. IV
   e. V

5. a

   c

   e

   g

   h

6. Any three of the following:

   a. Develops a soil and land-capability map of the land unit, a range-site and range-condition map of rangeland, and a woodland-suitability map of woodlands

   b. Compiles information about the different uses and adapatation of crops (including grasses, trees, and wildlife) for each kind of soil

   c. Assembles information about conservation measures needed on each kind of soil for each of the different safe uses

   d. Gives onsite assistance to the individual in making a conservation plan for his land unit

   e. Gives technical assistance in designing, laying out, and checking the construction and maintenance of dams, terraces, or other structures

   f. Gives technical assistance in selecting plant varieties, seeding methods and rates, and in solving problems that arise in managing pastures, woodlands, or wildlife habitat

   g. Services are extended to nonfarm rural land users as well as to urban land users

7. a

   b

   c

   e

   f

   h

   i

8. a. Program designed for college freshmen, sophomores, or juniors that are majoring in Agriculture

   b. Students qualify in a civil service examination

   c. The Soil Conservation Service hires student to work during nonschool periods at GS-3 after completing one year in college

   d. Student works each summer during the vacation period, goes on leave from the job in the fall, and returns to college

   e. Between sophomore and junior year, the student will be eligible for promotion to GS-4

   f. Between junior and senior year, students is eligible for promotion to GS-5

   g. Upon successful completion of work assignment and graduation and without further civil service examination, student is assigned to a full-time professional job

9. Evaluated to the satisfaction of the instructor.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

TERMINAL OBJECTIVES

After the completion of Unit VI, the student should be able to match terms associated with the Agricultural Stabilization and Conservation Service, select from a list the farm legislative acts that have been enacted through the years to control production, and explain in writing how the Agricultural Stabilization and Conservation Service is organized on the state and county level. The student should be able to select the primary responsibilities of the Agricultural Stabilization and Conservation Service and list the principal activities of the Agricultural Stabilization and Conservation Service. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms and definitions associated with the ASCS.
2. Select from a list the farm legislative acts that have been enacted through the years to control production.
3. Explain in writing how the ASCS is organized on the state and county level
4. Select from a list the primary responsibilities of the ASCS.
5. List the principal activities of the ASCS.
6. Complete a form listing facts about the county ASCS office and programs.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Discuss terminal and specific objectives
4. Discuss information and assignment sheets
5. Arrange for a representative from the county ASCS to talk to class
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet and turn in to instructor
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Assignment sheet
   #1--Local Facts About ASCS
4. Test
5. Answers to test

References:

1. ASCS Background Information. Production Adjustment Programs. USDA BI No. 5, 1972.

2. ASCS Background Information, The Agricultural Stabilization and Conservation Service. USDA BI No. 1, June 1972.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

INFORMATION SHEET

I. Terms and definitions

A. Agricultural Conservation Program--Cost-share program designed to assist and encourage landowners to carry out soil and water conservation practices. Objectives of the program are to (1) minimize erosion caused by wind and water, and (2) conserve resources and wildlife.

B. Agricultural Stabilization and Conservation Service--Agency of the U.S. Department of Agriculture that administers specified commodity and related land use programs for voluntary production adjustment, resource protection and price, market and farm income stabilization. Agency was established June 5, 1961, by direction of the Secretary of Agriculture.

C. Allotment--A national allotment is established annually for program crops (wheat, feed grains and cotton) which represents an estimate of the number of harvested acres of a commodity needed to produce the quantity necessary to fill domestic and export needs. The national allotment is apportioned to States, counties, and farms on the basis of the acreage planted to the commodity during specified base years.

D. Compliance--Meeting the terms and conditions of a program agreement or contract. Verification of compliance may be made by a visit to the farm by a representative of the landowner on the use being made of cropland on the farm for a specified crop year.

E. Commodity Loan Program--Loan program funded by the Commodity Credit Corporation which makes available to farmers a source of credit using farm-stored or warehouse-stored grain as security for the loan.

F. Conserving Base--The average acreage of cropland on the farm devoted in 1959 and 1970 to conserving uses. The conserving base included acreage devoted to (1) permanent or rotation cover of grasses and legumes, (2) summer or winter cover crops consisting principally of small grains, annual legumes, or annual grasses, (3) small grain cover crops when used for any purpose other than grain, and (4) idle cropland including clean tilled and summer fallowed cropland

G. County Committee--Persons elected by landowners and farm operators in a county to administer ASCS programs at the county level.

H. County Executive Director--Persons selected by the County Committee to manage the day-by-day operations of the County ASCS Office and to execute the policies of the county committee within limitations established by legislation or regulation.

I. Disaster Payments--Payments made to landowners and operators who due to natural causes are prevented from planting an allotment crop or who experience below average production on their farm. Allotments and farm established yields are used to determine disaster payment eligibility.

J. Farm Storage and Drying Equipment Loan Program--Program involving cash loans to landowners for the construction of grain storage structures and for the purchase of grain drying equipment incorporated into a farm storage facility.

K. Indemnity Payments--Payments made to dairy farmers and beekeepers to compensate them for losses because of chemical residue in the milk or death of bees from chemical causes beyond the control of the dairy farmer or beekeeper.

L. Parity Ratio--The general relationship between prices received by the farmer for commodities compared to the prices he must pay for items purchased.

M. Projected Yields--A yield established for a farm, county or State using actual production during an established base period (usually the five years preceding the year in which yields are determined).

N. Target Prices--Price level established for allotment crops by the Agriculture and Consumer Protection Act of 1973 which will result in indirect payments to farmers if the national average market price for the first five months of the marketing year is below the established "target price."

II. History of farm legislation enacted to control production

A. Agricultural Adjustment Act of 1933 (AAA)

(NOTE: The Agricultural Adjustment Act was passed May 12, 1933. Its goal was to restore prices to farmers at a level which would give agricultural commodities their 1909 to 1914 purchasing power. A Supreme Court decision of 1936 invalidated the production control provisions, including the tax on marketing, provided under the AAA of 1933.)

B. Soil Conservation and Domestic Allotment Act of 1936

(NOTE: This act combined the objective of promoting soil conservation and profitable use of agricultural resources with that of reestablishing and maintaining farm income at fair levels. The goal of income parity, as distinguished from price parity, was introduced into legislation for the first time.)

INFORMATION SHEET

C. Agricultural Adjustment Act of 1938

(NOTE: The Agricultural Adjustment Act of 1938 combined the conservation program of the 1936 legislation with new features designed to meet drought emergencies as well as the price and income crisis resulting from surplus production. A marketing control approach was substituted for direct production control. Authority was based on congressional power to regulate interstate and foreign commerce. The new features of the legislation included mandatory non-recourse loans for cooperating producers of corn, wheat, and cotton under certain supply and price conditions (if marketing quotas had not been rejected). Loans were at the option of the U.S. Secretary of Agriculture for producers of other commodities. Marketing quotas were to be proclaimed for corn, cotton, rice, tobacco, and wheat when supplies reached certain levels. Referendums were to be used to determine whether the marketing quotas proclaimed by the Secretary should be put into effect. Another feature was parity payments to producers of corn, cotton, rice, tobacco, and wheat in amounts which would provide a return as nearly equal to parity as available funds would permit. These payments were to supplement and not replace other payments. In addition to payments authorized under the continued Soil Conservation and Domestic Allotment Act for farmers in all areas, special payments were made in ten states to farmers who cooperated in a program to retire land unsuited to cultivation as part of a restoration land program initiated in 1938. The attainment of parity prices and parity income was stated as a goal of the legislation. Another goal was the protection of consumers by the maintenance of adequate reserves of food and fiber. Systematic storage of supplies made possible by non-recourse loans was the basis for the department's "Ever-Normal-Granary" plan.)

D. Agricultural Trade Development and Assistance Act (Public Law 480) of 1954

(NOTE: This act, which served as the basic authority for sale of surplus agricultural commodities for foreign currency, proved to be a major importance in disposing of farm products abroad.

The Agricultural Act of 1954 established price supports for the basic commodities on a flexible basis, ranging from 82.5 percent of parity to 90 percent for 1955, and from 75 percent to 90 percent thereafter.)

E. Agricultural Act of 1956--(Soil Bank)

(NOTE: The Soil Bank was a large-scale effort, similar in some respects to programs of the 1930's, to bring about adjustments between supply and demand for agricultural products by taking farmland out of production. The program was divided into two parts: (1) an acreage reserve; and (2) a conservation reserve. The specific objective of the acreage reserve was to reduce the amount of land planted to allotment crops wheat, cotton, corn, tobacco, peanuts, and rice. Under its terms,

INFORMATION SHEET

Farmers cut land planted in these crops below established allotments; or, in the case of corn, their base acreage, and received payments for the diversion of such acreage to conserving uses. In 1957, 21.4 million acres were in the acreage reserve. The last year of the acreage reserve program was to secure the diversion of some of the land from production of Agricultural commodities into specific conservation uses. Agreements called for diversion of the cropland for five to ten years.)

F. The Feed Grain Act of 1961

(NOTE: It provided that the 1961 crop of corn should be supported at not less than sixty-five percent of parity (the actual rate was seventy-four percent) and established a special program for diverting corn and grain sorghum (and barley if designated by the Secretary of Agriculture) acreage to soil-conserving crops or practices. Producers were eligible for price supports only after retiring at least twenty percent of the average acreage devoted to the two crops in 1959 and 1960. Subsequent acts in 1962, 1963, and 1964 included wheat and cotton as well as the feed grains.)

G. The Food and Agriculture Act of 1965

(NOTE: Programs established by the Food and Agriculture Act of 1965 were in effect from 1966 through 1969. The Wool Act of 1954 and the voluntary feed grain program begun in 1961 were extended through 1969. The voluntary wheat certificate program begun in 1964 was extended through 1969 with only limited changes.

The Act established a cropland adjustment program. The secretary was authorized to enter into five-to ten-year contracts with farmers calling for conversion of cropland into practices or uses which would: conserve water, soil, wildlife, or forest resources; or establish, protect, or conserve open spaces, national beauty, wildlife, or recreational resources; or prevent air or water pollution. Limited funding to enter into CAP contracts was provided in 1966 and 1967. Since that time the Congress has not authorized funds for any new CAP contracts.)

H. Agricultural Act of 1970

(NOTE: This legislation was enacted November 30, 1970. Major features of this act were:

1) Producers had more flexibility in making their farm-operating decisions.

2) It emphasized more reliance on the marketplace as the principal source of farm income.

Significant changes were made in the supply management programs for wheat, feed grains, and cotton. The existing adjustment programs for peanuts, tobacco, and rice which were a part of the agricultural legislation were continued without change.

INFORMATION SHEET

The act included for the first time a limitation ($55,000) on the payments a participating producer would be entitled to receive. This limitation applied to each program (wheat, feed grains, and cotton) separately.

The portion of the act relating to wheat, feed grains, and cotton cover only the 1971, 1972, and 1973 crops. If new or extending legislation is not enacted during the 1973 legislative session, production adjustment work in 1974 will follow the provisions of prior legislation. The 1970 act also included a provision whereby farmers participating in the Set Aside program could receive additional payments for permitting the public to hunt or fish on the farm. In 1972 and 1973 this portion of the act was operated on a pilot basis in fifty counties (10 states, 5 counties each). The test pilot program has been well received by both farmers and the public.)

I. Agriculture and Consumer Protection Act of 1973

(NOTE: This legislation was signed into law on August 10, 1973, and is applicable to the 1974 through 1977 crop year. It authorizes continuation of the cropland "set-aside" approach initiated in the Agricultural Act of 1970, however the Secretary of Agriculture has stated that a "set-aside" of land will not be required through the duration of the Act. Also, he has eliminated the requirement to maintain the farms normal conserving base in conserving crops.

The 1973 Act initiated an established or "target price" approach for the 1974-1977 crop years. Direct payments will not be made to program participants unless the national average market price for the first five months of the commodity marketing year falls below the target price established by the Act.

The Act also provided provisions under which a landowner or farm operator may earn payments if prevented from planting a crop due to natural causes or if either the actual or appraised production for the farm is below two-thirds of the amount determined by multiplying the farms commodity acreage allotment times the yield established for the farm.

The maximum total payment a person may receive by participation in government farm programs covered by the Act of 1973 is $20,000.

II. ASCS Field Organization

A. Each State, plus Puerto Rico, has a three to five member committee appointed by the Secretary of Agriculture responsible for the establishment of policy and general guidelines to carry out ASCS programs at the State level. The director of the Cooperative Extension Service is an ex-officio member of each State ASCS Committee.

B. A State Executive Director and State office staff are employed by the State committee to execute the policies of the State committee.

and to be responsible for the day-to-day operations of ASCS programs.

C. District Directors, reporting to the State Executive Director, are responsible for the supervision of a specified number of counties to assure uniformity of administration of programs. Kansas is divided into nine districts for the administration of ASCS programs.

D. County committees of three members each are elected by eligible landowners and operators in each county to determine policy and establish guidelines within limitations established by legislation, regulations, or State committee action. The county agricultural extension director is an ex-officio member of the county committee.

E. A county executive director is employed by the county committee to carry out committee policy and to supervise the day-to-day operation of the county office. The county executive director hires the necessary office and field personnel to carry out assigned programs in the county.

IV. Primary responsibilities of the ASCS

A. To improve the economic stability of agriculture by aiding farmers to achieve supply-demand balances that result in an equitable share of both domestic and export markets, and an equitable return on those markets

B. To maintain an even flow of quality products to market at reasonable price to both producer and consumer

C. To improve and protect soil and water resources by aiding farmers to carry out conservation and land use practices

V. Principal activities of ASCS

A. Commodity support operations

Examples: 1) Loans to farmers on specified crops and facilities for storing those crops, 2) Direct purchases of commodities from farmers and processors, 3) Acreage set aside payments on specified commodities, 4) Production payments for wool and mohair, 5) Prevented planting and low yield payments resulting from conditions beyond control of the farmer.

B. Production adjustment to balance supply and demand, for specified commodities

1. Wheat Program

2. Feed Grain Program

(NOTE: For specific information on these programs, contact the ASCS office.)

INFORMATION SHEET

C. Conservation assistance through sharing with farmers and ranchers the cost of installing needed soil, water, woodland, and wildlife conservation and pollution abatement practices under the Agricultural Conservation Program. 1975 Kansas Agricultural Conservation Program Plan is now in use

D. Forestry Incentive Program available in designated counties to encourage the planting of forestry products for timber production and to encourage improved management of existing timber resources

E. Management of the Commodity Credit Corporation inventories acquired under commodity programs

(NOTE: This was managed through sales, donations, storage, and related processing and shipping arrangements. The Export Marketing Service is responsible for programs dealing with the export of privately-owned agricultural commodities.)

F. The sugar program to provide an equitable sharing of the U.S. sugar market among domestic and foreign supplying areas, to protect the income of domestic producers, and to assure consumers a stable supply of sugar at reasonable prices. (The Sugar Act expired with the 1974 Crop Year)

G. Disaster and defense activities to augment feed supplies for farmers and ranchers in areas where natural disasters have reduced feed, to provide emergency conservation assistance in restoring farmlands seriously damaged by widespread flood or drought, and to assist in preparedness planning for civil defense

VI. Conservation Practices approved for Cost-Share assistance under the Agriculture Conservation Program

A. Establishing Permanent Vegetative Cover

B. Improving Permanent Vegetative Cover

C. Planting Trees

D. Improving a Stand of Forest Trees

E. Water Impoundment Reservoirs

F. Constructing Terrace Systems

G. Diversion Terraces

H. Permanent Wildlife Habitat

INFORMATION SHEET

I. Sediment Retention, Erosion or Water Control Structures

J. Sediment, Chemical, or Water Runoff Control Measures

K. Windbreaks or Shelterbelts

L. Reorganizing Irrigation Systems

M. Developing Facilities for Livestock Water

N. Animal Waste Storage and Diversion Facilities

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

ASSIGNMENT SHEET #1--LOCAL FACTS ABOUT ASCS

Determine the following information by either visiting a ASCS office or listening to a ASCS employee talk to your class.

1. Name the members of the county ASCS committee.

2. Name the town where your ASCS office is located.

3. List the types of commodity support programs available to the farmers in your county.

ASSIGNMENT SHEET #1

4. List the production adjustment programs along with the principal participation requirements as they apply to your county.

   a. "wheat" (If grown in your county)

ASSIGNMENT SHEET #1

c. Feed grains

d. "others"

ASSIGNMENT SHEET #1

5. List conservation assistance through cost sharing arrangement with farmers and ranchers in your county.

6. List disaster and defense activities that have been provided to farmers in your county through the ASCS. (In the past five years)

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

TEST

1. Match the terms on the right with the proper definition.

_____a. Meeting the terms and conditions of a program agreement or contract.

_____b. The average acreage of cropland on the farm devoted in 1959 and 1970 to conserving uses.

_____c. Agency of the U.S. Dept. of Agriculture that administers specified commodity and related land use programs

_____d. Relationship between prices received compared to the prices he must pay

_____e. Payments made to farms who are prevented from planting an allotment crop or who experience below average production

_____f. Loans to landowners for the construction of grain storage structures and for the purchase of grain drying equipment

_____g. Persons elected by landowners and farm operators in a county to administer ASCS programs

_____h. Cost-share program designed to assist and encourage landowners to carry out soil and water conservation practices.

_____i. Payments made to dairy farmers and beekeepers to compensate them for losses because of chemicals, beyond the control of the dairy farmer or beekeeper

1. Agricultural Conservation Program
2. Agricultural Stabilization and Conservation Service (ASCS)
3. Allotment
4. Compliance
5. Commodity Loan Program
6. Conserving Base
7. County Committee
8. County Executive Director
9. Disaster Payments
10. Farm Storage and Drying Equipment Loan Program
11. Indemnity Payments
12. Parity Ratio
13. Projected Yields
14. Target Prices

_____j. By the Agriculture and Consumer Protection Act of 1973 which results in direct payments to farmers if the national average market prices are below them.

_____k. Loan program farmers using farm-stored or warehouse-stored grain as security for the loan.

_____l. A yield by using actual production during an established base period

_____m. Apportioned to states, counties, and farms on the basis of the acreage planted to the commodity during specified base years.

_____n. Person to manage operations of the County ASCS Office and to execute the policies of the county committee

2. Select from the list below the farm legislative acts that have been enacted through the years to control production. Place an "X" by the correct answers.

_____a. Soil Conservation and Domestic Allotment Act of 1936

_____b. Agricultural Adjustment Act of 1933

_____c. Agricultural Adjustment Act of 1941

_____d. Agricultural Trade Development and Assistance Act (Public Law 480) of 1954

_____e. Agricultural Act of 1964 (Soil Bank

_____f. The Feed Grain Act of 1961

_____g. Agricultural Act of 1970

_____h. Agriculture and Consumer Protection Act of 1973

3. Explain in writing how the ASCS is organized on the state and county level

a. State----

b. County----

4. Select from the list below the primary responsibilities of the ASCS. Place an "X" by the correct answers.

_____a. To maintain an even flow of quality products to market at a reasonable price to both producer and consumer

_____b. To force farmers to carry out conservation and land use practices

_____c. To improve the economic stability of agriculture by aiding farmers to achieve supply-demand balances that result in an equitable share of both domestic and export markets, and an equitable retrun on those markets

5. Name three activities of the ASCS.

a.

b.

c.

6. List facts about your county ASCS.

(NOTE: If this has not been accomplished prior to the test, ask your instructor when the above activity should be completed.)

7. List six conservation practices approved for cost-share assistance under the Agriculture Conservation Program.

a.

b.

c.

d.

e.

f.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
UNIT VI

ANSWERS TO TEST

1. a. 4
   b. 6
   c. 2
   d. 12
   e. 9
   f. 10
   g. 7
   h. 1
   i. 11
   j. 14
   k. 5
   l. 13
   m. 3
   n. 8

2. __X__ a.
   __X__ b.
   _____ c.
   __X__ d.
   _____ e.
   __X__ f.
   __X__ g.
   __X__ h.

3. a. State

Each state, has a three to five member committee appointed by the Secretary of Agriculture responsible for the establishment of policy and general guidelines to carry out ASCS programs at the State level. The Director of the Cooperative Extension Service is an ex-officio member of each State ASC Committee.

A State Executive Director and State office staff are employed by the State committee to execute the policies of the State committee and to be responsible for the day-to-day operations of ASCS programs.

District Directors, reporting to the State Executive Director, are responsible for the supervision of a specified number of counties to assure uniformity of administration of programs. Kansas is divided into nine districts for the administration of ASCS programs.

b. County

County committees of three members each are elected by eligible landowners and operators in each county to determine policy and establish guidelines within limitations established by legislation, regulations, or State committee action. The County agricultural extension director is an ex-officio member of the county committee.

A county executive director is employed by the county committee to carry out committee policy and to supervise the day-to-day operation of the county office. The county executive director hires the necessary office and field personnel to carry out assigned programs in the county.

4. a

c

5. Any three of the following:

a. Commodity support operations

b. Production adjustment to balance supply and demand, for specified commodities

c. Conservation assistance through sharing with farmers and ranchers the cost of installing needed soil, water, woodland, and wildlife conservation and pollution abatement practices under the Rural Environmental Assistance Program (REAP)

d. Forestry incentive program available in designated counties to encourage the planting of forestry products for timber production and to encourage improved management of existing timber resources

- e. Management of the Commodity Credit Corporation inventories acquired under commodity programs
- f. The sugar program to provide an equitable sharing of the U.S. sugar market among domestic and foreign supplying areas, to protect the income of domestic producers, and to assure consumers a stable supply of sugar at reasonable prices
- g. Disaster and defense activities to augment feed supplies for farmers and ranchers in areas where natural disasters have reduced feed, to provide emergency conservation assistance in restoring farmlands seriously damaged by widespread flood or drought, and to assist in preparedness planning for civil defense

6. Evaluated to the satisfaction of the instructor

7. List any six of the Regular ASCS Practices

   a. Establishing Permanent Vegetative Cover

   b. Improving Permanent Vegetative Cover

   c. Planting Trees

   d. Improving a stand of forest trees

   e. Water impoundment Reservation

   f. Constructing Terrace Systems

   g. Diversion Terraces

   h. Permanent Wildlife Habitat

   i. Sediment Retention, Erosion or Water Control Structures

   j. Sediment, Chemical, or Water Runoff Control Measures

   k. Windbreaks or Shelterbelts

   l. Reorganizing Irrigation Systems

   m. Developing Facilities for Livestock Water

   n. Animal Waste Storage and Diversion Facilities

BUILDING FARM FENCES

Unit I

Terminal Objectives

After the completion of Unit I, the student should be able to match terms associated with farm fencing. He should be able to plan the location of a farm fence and arrange in order the procedure for setting line post and the procedure for placing, stretching, and attaching a fence. He should be able to construct a wood anchor-and-brace assembly. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

Specific Objectives

After completion of this unit, the student should be able to:

1. Match terms associated with fence construction when given the proper definition.
2. Select from a list the factors to consider when planning the location and arrangement of fences.
3. Arrange in order the steps to follow in planning the fencing layout on a farm.
4. List the kinds of temporary and permanent pasture fences.
5. Name the factors that influence the kind of fence to construct.
6. Select the advantages and disadvantages of electric fences.
7. Name the factors that determine fence life.
8. Distinguish between the two types of joints generally recognized in woven wire.
9. Arrange in order the steps to follow when constructing fences in: open level areas, open rolling areas, areas with heavy undergrowth, and contour areas.
10. Match the types of anchor-and-brace assemblies when given the length and contour of the fence.
11. Select from the illustrations proper and improper methods of bracing ends and corners.
12. Arrange in order the proper steps for constructing the steel anchor-and-brace assembly.

13. Name safety factors in fence construction.

14. Arrange in order the procedures for setting line post.

15. Arrange in order the steps to follow when placing a woven fence for stretching.

16. Arrange in order the steps to follow when stretching a woven fence.

17. Arrange in order the steps for attaching a woven fence to the second anchor post or brace-line post.

18. Select from a list the correct procedure for attaching a fence to line post.

19. Arrange in order the steps used in unrolling and stretching barbed wire.

20. Explain in writing the reason fences should be grounded for lightning protection.

21. Name the factors that determine the number and kind of line post to use.

22. Identify tools and materials needed to construct farm fences.

23. Determine the cost of constructing various type fences.

24. Demonstrate the ability to construct a wood anchor-and-brace assembly.

BUILDING FARM FENCES
Unit I

Suggested Activities

Instructor:

1. Provide students with objective sheet.
2. Provide students with information, assignment, and job sheets.
3. Make transparencies.
4. Discuss terminal and specific objectives.
5. Discuss information and assignment sheets.
6. Demonstrate and discuss procedures outlined in the job sheets.
7. Give test.

Students:

1. Read objectives.
2. Study information sheet.
3. Complete assignment sheet.
4. Demonstrate the ability to accomplish the procedures outlined in the job sheets.
5. Take test.

Instructional Materials

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
   TM 1--Laying Out Fields to Fit Land Capability
   TM 2--Protective Coating
   TM 3--Life of Wire According to Coating
   TM 4--Tools and Materials Used in Fencing
4. Assignment Sheet
   #1--Determine the Cost of Fences
5. Job Sheet
   #1--Construct the Wood Anchor-and-Brace Assembly
6. Test
7. Answers to test

References:

1. American Association for Agricultural Engineering and Vocational Agriculture. Planning Farm Fences. Athens, Georgia: Foote and Davis (Division of McCall Printing), 1966.

2. American Association for Agricultural Engineering and Vocational Agriculture. Building Farm Fences. Doraville, Georgia: Foote and Davis (Division of McCall Printing Company), 1969.

BUILDING FARM FENCES
Unit I

INFORMATION SHEET

I. Terms and definitions

  A. Permanent fence - Fence left in the same location for several years; under normal conditions the fence will exert 3000 to 4500 pounds pull on the anchor-and-brace assembly

  B. Movable fences - Intended to stay in one location for only a few weeks

  C. Line wires - Wires that run lengthwise

  D. Stay wires - Vertical wires that tie the line wires together

  E. Filler wires - Wires between the top and bottom line wires

  (NOTE: These are the horizontal wires in woven fences)

  F. Suspension fences - Used for cross or boundary fencing on cattle ranges

  G. Tension curve - Spring effect that is present in woven wire

  H. Wire clip - Fastener used on steel post

  I. Staple - Fastener used on wooden post

  J. Wood preservative - Product used to treat wood to increase life

  K. Clamp ~~bar~~ - A device made of wood or iron used while stretching woven fence

II. Factors to consider when planning the location and arrangement of fences

  A. Land capability

  B. Coordination of fields to cropping plans

  C. Relation of fences to soil conservation practices

  D. Arrangement of fields and passageways for convenience and labor savings

  E. Placement justification of permanent and movable fences

  F. Building order of permanent fences

INFORMATION SHEET

G. Safety factors to consider in fencing

1. Protective clothing

   a. Leather gloves
   b. Long sleeve shirt
   c. Minimum of loose fitting clothes

2. Proper position for nailing, stretching, and fastening wires

III. Steps to follow in planning the fencing layout on a farm

A. Sketch layout of farm

(NOTE: An aerial map is helpful in planning a fencing program)

B. Divide the farm into areas best suited to: (Transparency 1)

1. Permanent pastures or hay production

2. Woodlands not pastured

3. Woodlands pastured

4. Cultivated areas

(NOTE: Lay out fields to fit their land capability. Fences should be planned parallel to the waterways and on the pasture or wood-area side of the waterway)

C. Divide each area into the number and size of fields needed for specific types of cropping systems as related to land capability

D. Sketch proposed lane to connect farm building with permanent pastures

(NOTE: Locate permanent lanes to avoid erosion, yet allow access to as many fields as possible)

E. Indicate gates and other passageways

1. If possible, locate gates and passageways for livestock and equipment in the corner of each field closest to the buildings

2. If fields are on opposite sides of the highway, place gates directly opposite each other

IV. Kinds of temporary and permanent pasture fences

A. Woven Wire

B. Barbed Wire

C. Electric fence

D. Combination of above

INFORMATION SHEET

V. Factors that influence the kind of fence

  A. Kind of livestock to be fenced

  B. Combination of different kinds of livestock in the same field

  C. Frequency livestock are checked

  D. Necessity to fence out dogs or wolves

  E. Size of area in which animals are confined

  F. Money available for fencing

  G. Estimated life of fence

VI. Advantages and disadvantages of electric fences

  A. Advantages

    1. Use of low-cost, simple fencing materials and methods

    2. Inexpensive to operate

    3. Easy to build or remove

    4. Protects livestock or poultry from many predatory animals

    5. Protects and extends the usefulness of old permanent fences

    6. Easy to keep fence rows clean

  B. Disadvantages

    1. Requires training livestock in beginning usage

    2. The charged wire may short and become less effective when grass, weeds, or brush touch the wire

    3. Requires full time operation for maximum effectiveness

    4. Sometimes ineffective in extra dry weather if controller is not well grounded

    (NOTE: Do not build your own controller as this practice is extremely dangerous to both humans and livestock)

VII. Factors that determine fence life

  A. Kind of protective coating

    1. Line (commonly called galvanizing) and aluminum coating are widely used

INFORMATION SHEET

2. Aluminum-coated steel wire is three to five times more resistant to corrosion than an equal thickness of zinc coating

(NOTE: Aluminum-coated wires is damaged from oak leaf drippings. Avoid using this wire where oak trees are grown)

B. Thickness of protective coating (Transparencies 2 and 3)

1. Period of service before rusting depends on whether it is being used in dry, humid, coastal, or industrial areas

2. Smaller size wires are coated with less zinc

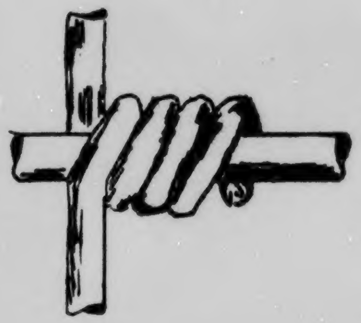
C. Size of wire

D. Type of steel in wire

VIII. Two types of joints generally recognized in woven wire fences

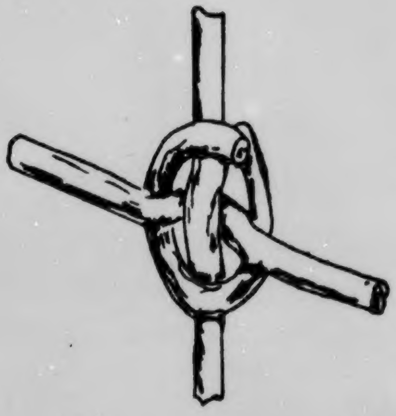
A. Hinge joint

(NOTE: The hinge joint is the most common fence manufactured at the present time)



B. Stiff-stay joint

(NOTE: This joint will not move sideways, but after being straightened several times, the stay wires may break)

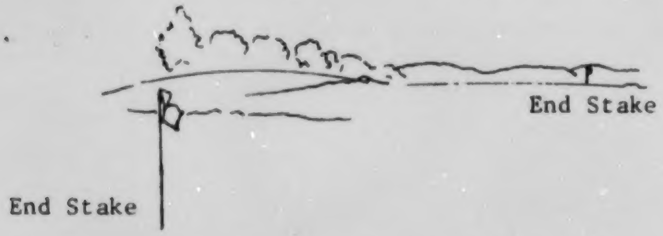


INFORMATION SHEET

IX. Steps in constructing fences in:

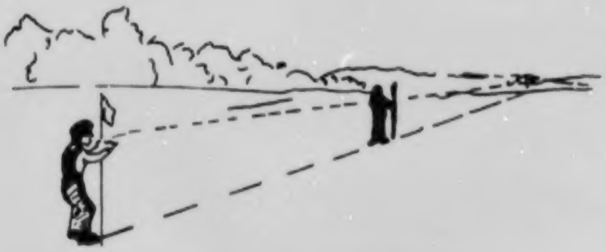
A. Open level areas

1. Set stake at each end of proposed fence line

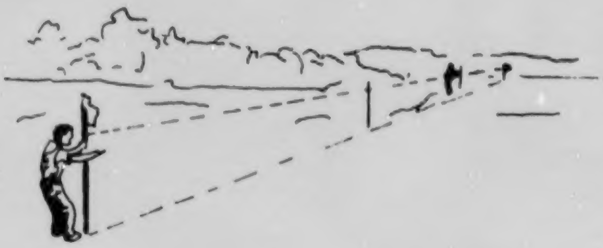


2. Station someone at one of the end stakes to help with alignment of remaining stakes

3. Proceed about 100 feet toward other end; align the posts



4. Proceed about 100 feet further and set another stake even with all three stakes

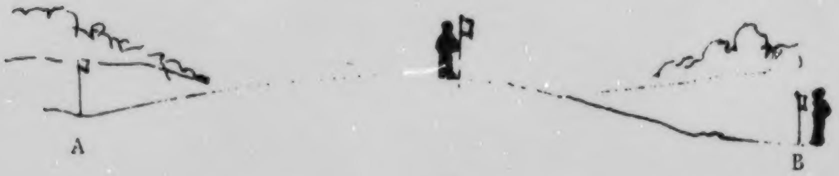


5. Continue setting additional stakes about every 100 feet until complete fence line is staked

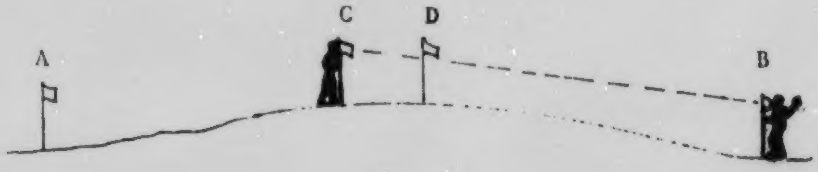
INFORMATION SHEET

B. Open rolling areas

1. Set stake at each end of proposed fence line



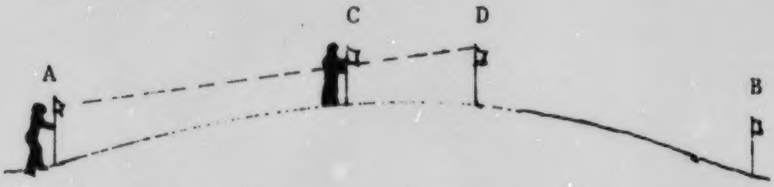
2. Place two stakes about ten feet apart on top of hill so both are visible from either end stake



3. Align two center stakes (C and D) from one of the end stakes

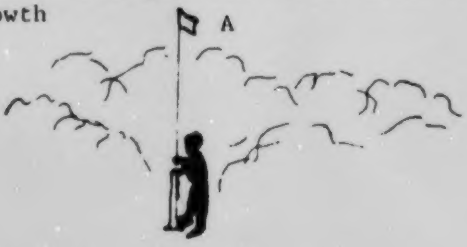
4. Check alignment of center stakes from other end stakes

(Note: Center stakes may have to be moved several times before satisfactory alignment can be secured from both end stakes.)



C. Areas with heavy undergrowth

1. Mount a 12 to 15 foot pole at end of fence line with heaviest growth

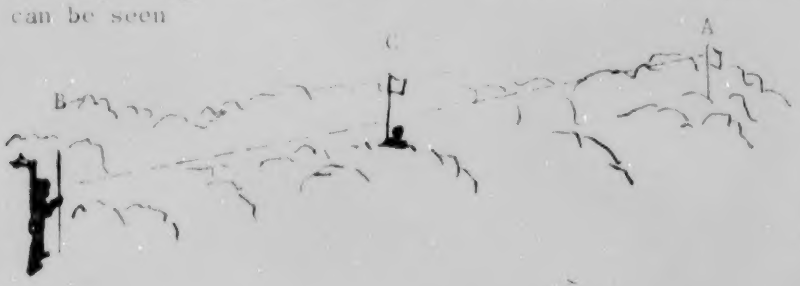


INFORMATION SHEET

2. Check pole or pipe with level to make sure it is vertical

3. Place stake at other end of fence line

4. While sighting from short end, stake "B" to pole "A" at other end; align second stake "C" as far inside thicket as it can be seen

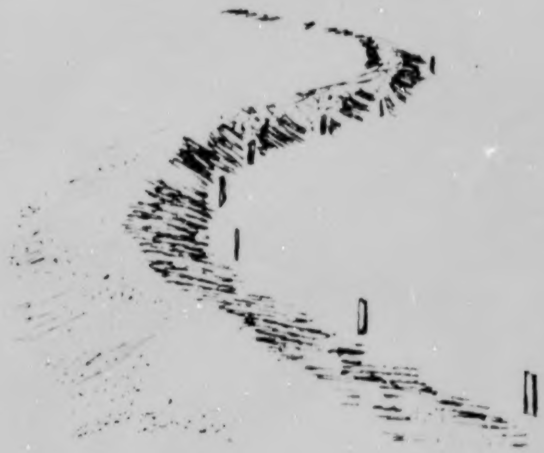


5. Clear area between stakes "B" and "C" and some distance beyond stake "C"

6. Establish another stake in the same manner working until line is completely established

D. Contour areas

1. Stake out smooth curve along contour strip or terrace

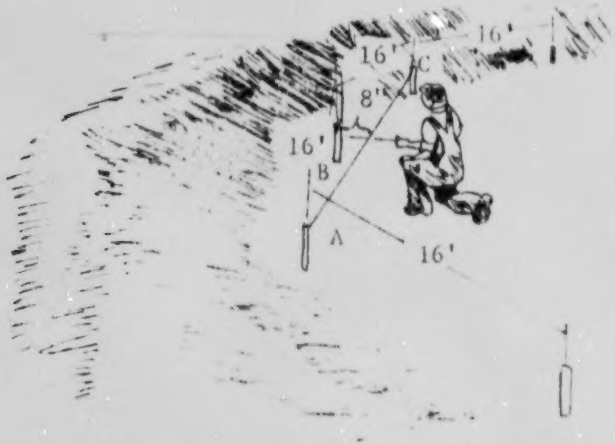


2. If there is excessive curve at any one point, select three stakes at point of greatest curvature

3. Stretch string between first "A" and third "C" stakes

INFORMATION SHEET

4. Measure distance from center "B" stake to string

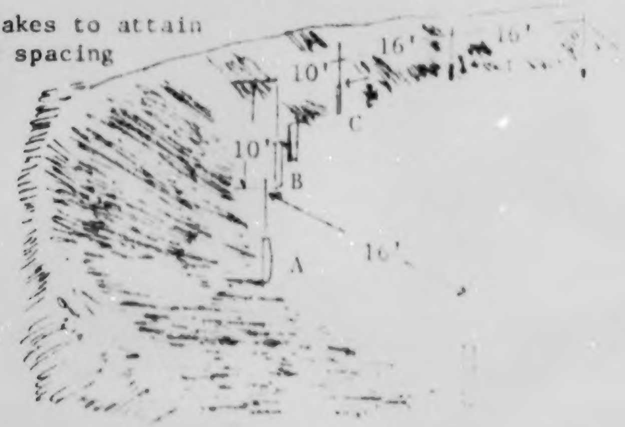


5. Decrease post spacing as shown in table below if measurement is more than four inches

Example
POST SPACING FOR CONTOUR FENCES

Distance from center stake to string Inches	Recommended post spacing Feet
4 or less	16
4 - 5	15
5 - 6	14
6 - 8	12
8 - 14	10
14 - 20	8

6. Set stakes to attain proper spacing



INFORMATION SHEET

7. Repeat steps three to six any place there appears to be surplus curvature

8. Check to see that no single post is out of line with the curve

(Note: By keeping the curve smooth, fence wire will pull equally against each post.)

X. Types of anchor-and-brace assemblies used

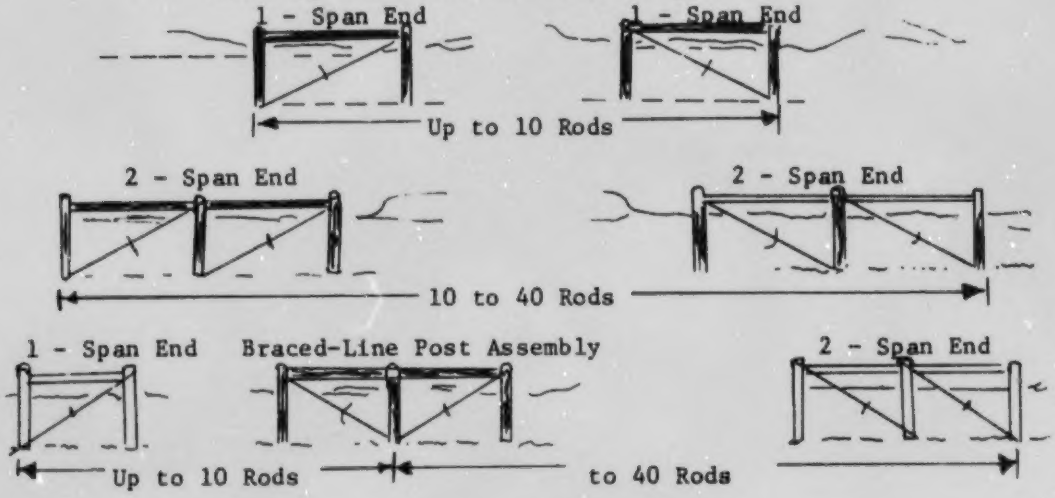
(Note: The type of assembly varies according to the length and contour of the fence.)

A. Straight fences on flat land

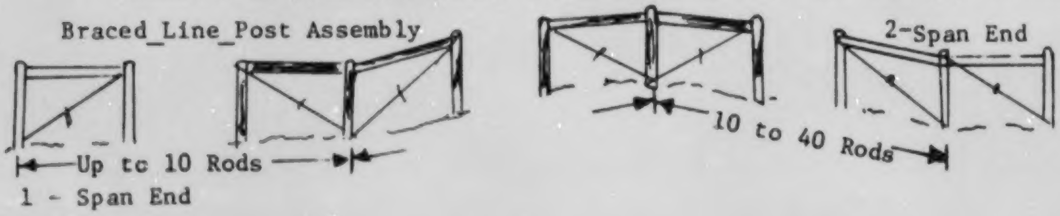
1. For fence lengths of 10 rods or less, use single-span end construction

2. For fence lengths of 10 to 40 rods, use double-span end construction

3. For fences more than 40 rods long, use a braced-line-post assembly to divide the fence lengths


1 - Span End
1 - Span End
Up to 10 Rods
2 - Span End
2 - Span End
10 to 40 Rods
1 - Span End
Braced-Line Post Assembly
2 - Span End
Up to 10 Rods
to 40 Rods

B. Straight fences on rolling land--Fence stretching is easier if braced-line-post assemblies are located at the foot and top of each hill


Braced_Line_Post Assembly
2-Span End
Up to 10 Rods
10 to 40 Rods
1 - Span End

INFORMATION SHEET

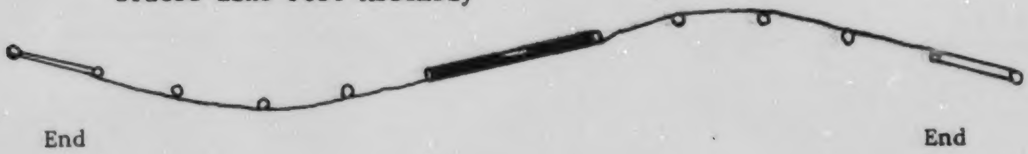
C. Contour fences

1. Contour fences more than 20 rods long should have a braced-line-post assembly installed to keep the stretches to 20 rods or less

2. Install in a straight section at least one post span away from a curve

   (NOTE: Do not install on a curve; it will not hold well.)

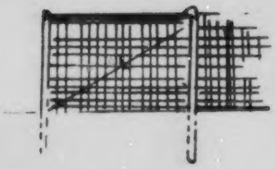
Braced-Line-Post Assembly



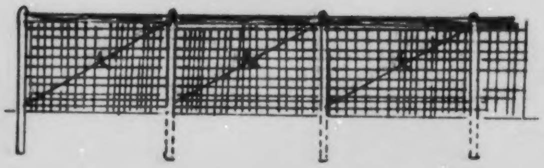
XI. Methods of bracing ends and corners

A. Proper methods

1. Wood horizontal-brace assembly



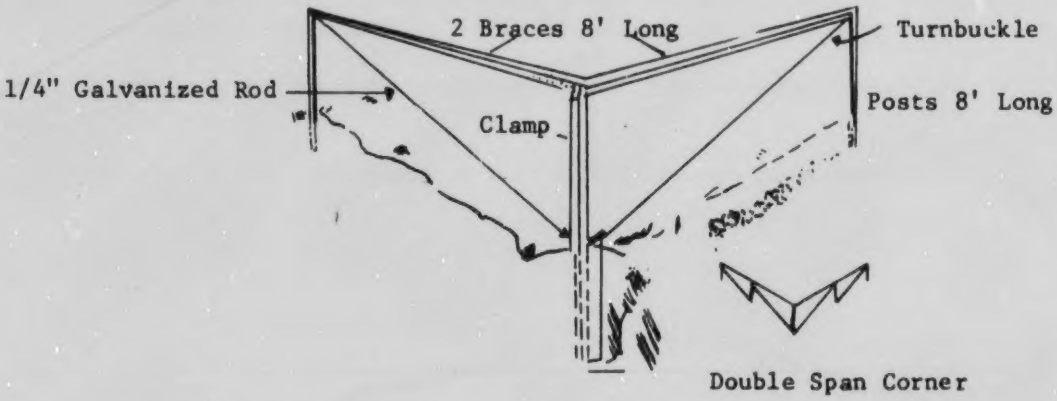
10 Rods or Less



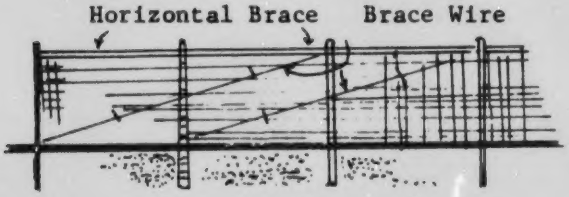
Over 40 Rods

INFORMATION SHEET

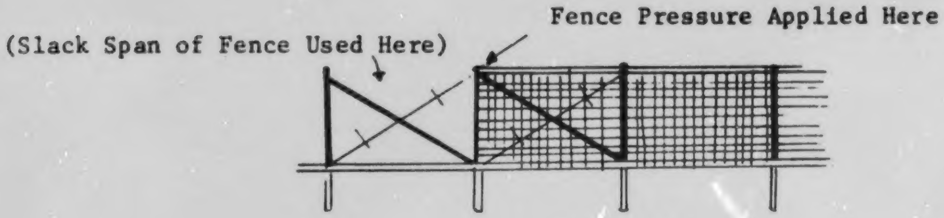
2. Steel end and corner horizontal-brace assembly


2 Braces 8' Long
Turnbuckle
1/4" Galvanized Rod
Posts 8' Long
Clamp
Double Span Corner

3. Rosemount anchor-and-brace assembly--Designed for extra heavy fence pull caused by wind or snow

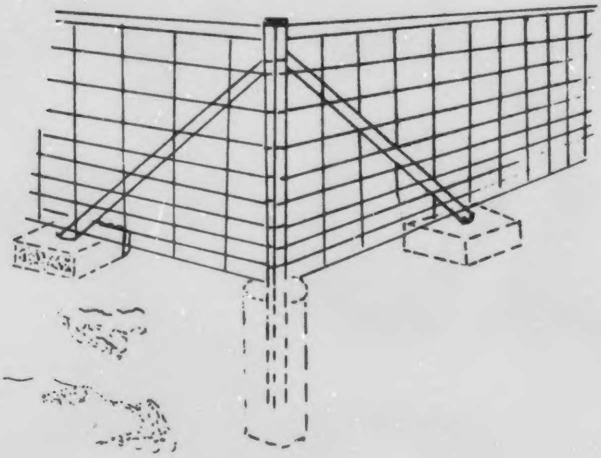

Horizontal Brace
Brace Wire

4. Cross-braced, double-span assembly--Used for extra heavy fence pull


Fence Pressure Applied Here
(Slack Span of Fence Used Here)

INFORMATION SHEET

5. Steel anchor post and steel diagonal brace set in concrete



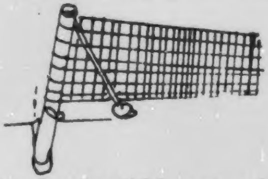
(NOTE: Use minimum size post for end or corner assemblies.)

INFORMATION SHEET

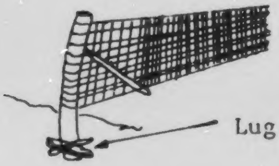
B. Improper methods

1. Simple anchor-and-brace assembly

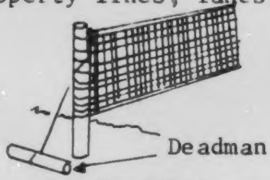
   (Note: When fence is stretched, post rises out of ground.)



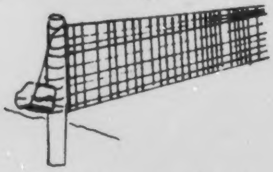
2. Lugs on bottom of post--Lugs will rot allowing fence to give



3. "Deadman"--Takes extra time to install and is unsatisfactory for fences along property lines, lanes, ditches, and road right-of-ways



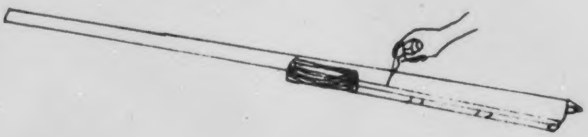
4. Boulder hung on the post--Unsightly and inadequate



XII. Constructing the steel anchor-and-brace assembly

A. Mark ground line on post with chalk

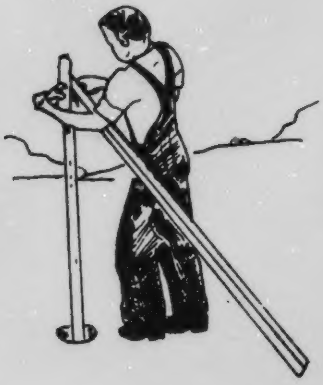
(Note: You can also mark your digger or auger handle



B. Dig anchor post hole 12 inches in diameter and 3 1/2 feet deep

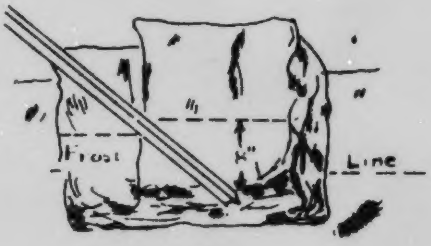
INFORMATION SHEET

C. Attach brace to anchor post



D. Dig hole where brace contacts ground

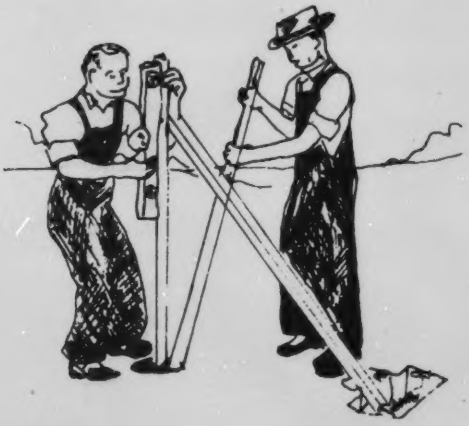
(NOTE: In areas where ground freezes deeply, hole must be deepened to provide eight inches of concrete below frost line. If this is not done, frost may raise concrete pier.)



E. Repeat steps "C" and "D" if second brace is used for corner construction

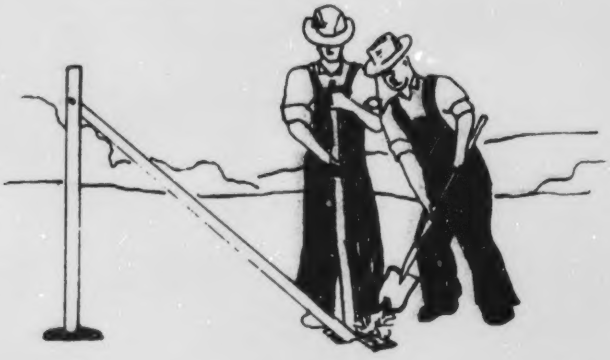
F. Mix and place concrete around anchor post--Slope concrete away from post to drain away water

(NOTE: Avoid a soupy mixture of concrete as it is weak and will not hold post in plumb position.)



INFORMATION SHEET

G. Place concrete for brace pier--Tamp concrete as it is placed

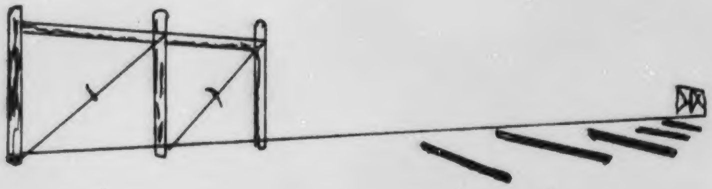


H. Repeat same steps for remaining anchors and braces

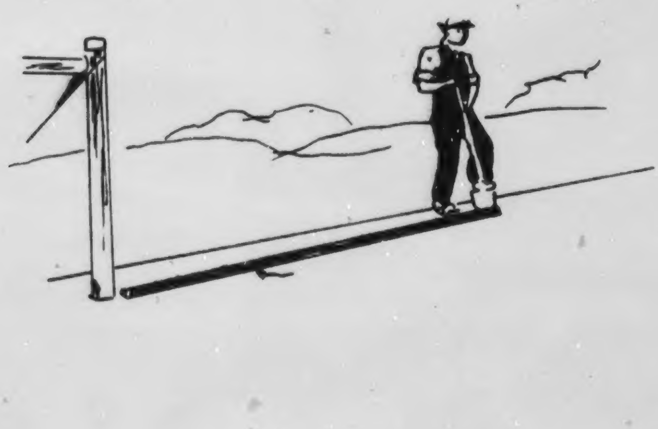
(NOTE: Concrete should cure for at least one week before fence is attached.)

XIII. Procedure for setting line post

A. Stretch cord, rope, or strand of barbed wire between two anchor-post assemblies



B. Measure line post spacing with gauge pole



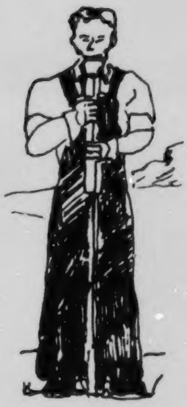
INFORMATION SHEET

C. Mark ground line on post or digging tool with chalk or crayon.

(NOTE: Ground line is determined by figuring overall height of fence plus about three or four inches to allow for post extending above fence.)

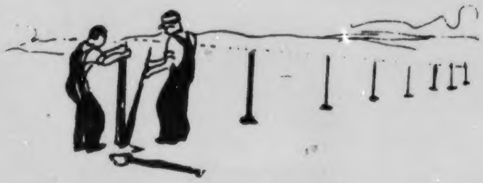
D. Dig or bore hole for post

(NOTE: Drive steel post into ground with tubular fence post driver.)



E. Align post as dirt is backfilled into hole

(NOTE: If you are contour fencing, lean top of post to outside of curve about two inches.)

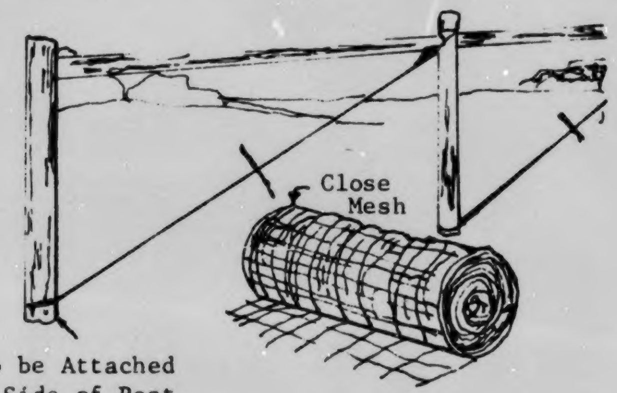


INFORMATION SHEET

XIV. Placing a woven fence for stretching

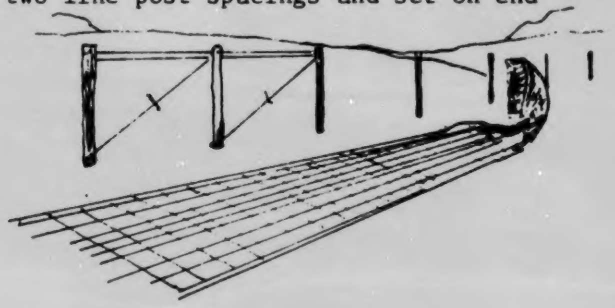
A. Examine fence roll to determine from which end of the line fence should be unrolled

(Note: The fence is in proper position to unroll when the bottom of the roll (close mesh end) is next to post line.)

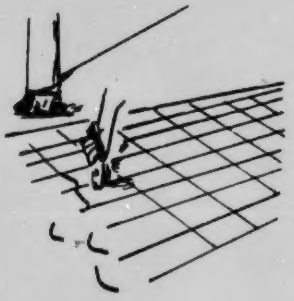


Fence to be Attached
to this Side of Post

B. Starting ahead of anchor post (at least two feet), unroll fence one or two line post spacings and set on end



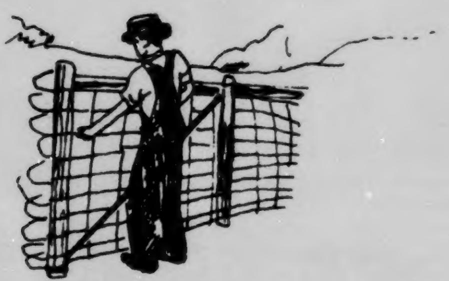
C. Remove one stay wire from top to bottom



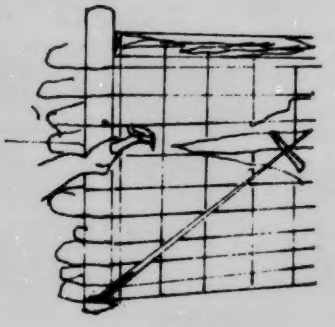
INFORMATION SHEET

D. Stand fence against anchor post and adjust to desired height

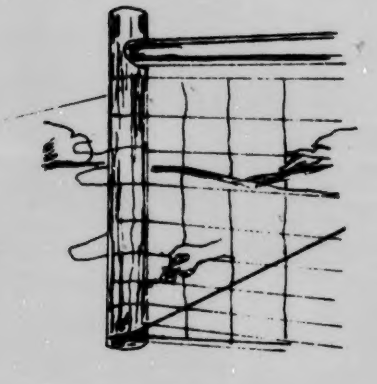
(NOTE: Lift about three inches if barbed wire is to be used under woven wire. If barbed wire is not used under fence, lower to height of about one-half inch above ground.)



E. Staple fence into position

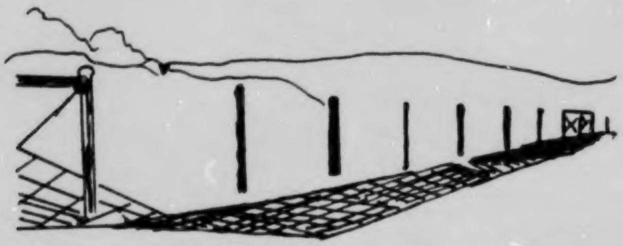


F. Extend each line around post and wrap wire on itself



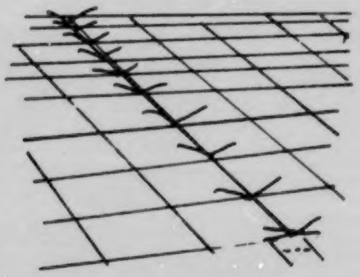
INFORMATION SHEET

G. Complete unrolling of fence to next anchor post assembly

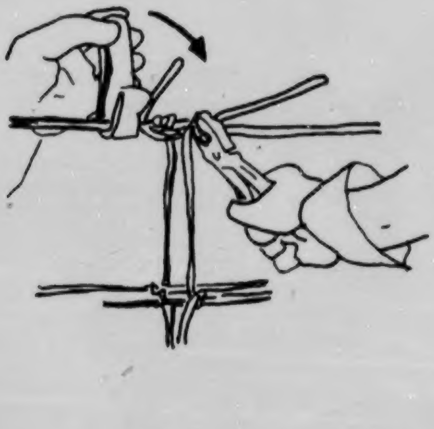


H. If it is necessary for you to splice two sections of fence together, proceed as follows:

1. Cut ends of line wires on each section so about 4 inches of each line wire extends beyond stay wire
2. Pull ends of fence sections together until stay wires meet

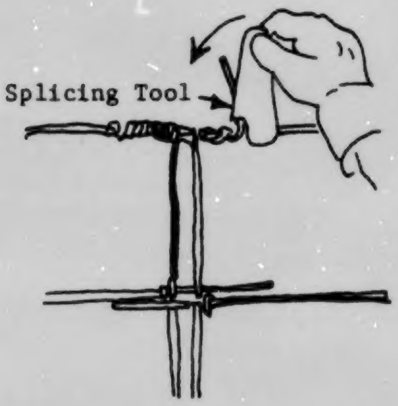


3. Bend top line wire of one fence section around top line wire of other fence section and wrap



INFORMATION SHEET

4. Wrap remaining top line wire in opposite direction

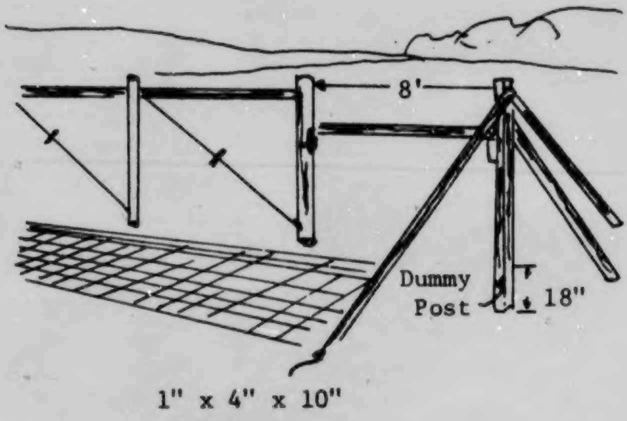

Splicing Tool

5. Follow same procedure with remaining line wires

XV. Steps to follow when stretching a woven fence

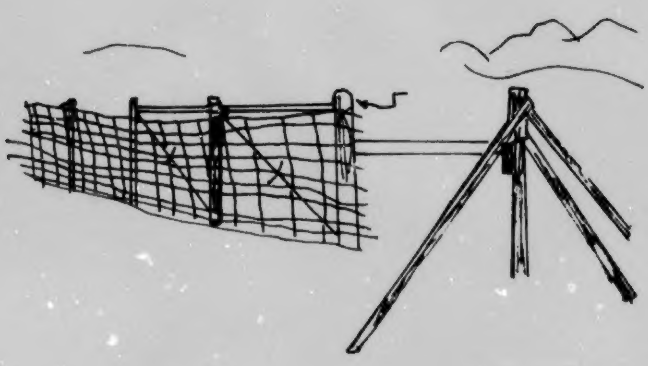
(Note: Procedures given here are for double-jack, single-jack, or block-and-tackle fence stretchers.)

A. Erect dummy post for attaching stretchers

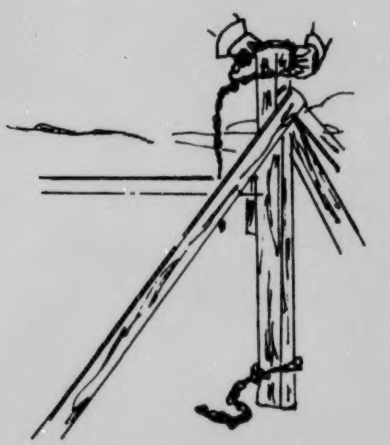

8'
Dummy Post
18"
1" x 4" x 10"

INFORMATION SHEET

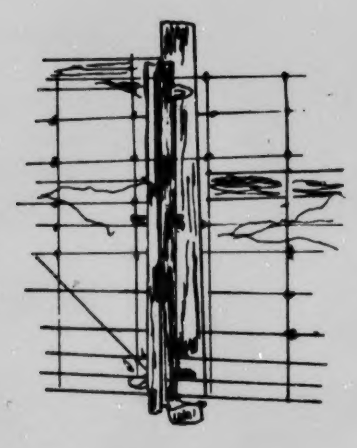
B. Stand fence against line post



C. Attach chain (or cable) of stretchers to dummy post

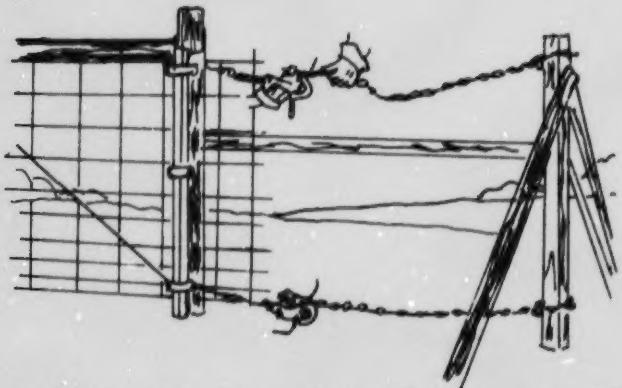


D. Attach clamp bar to fence at a position opposite anchor post

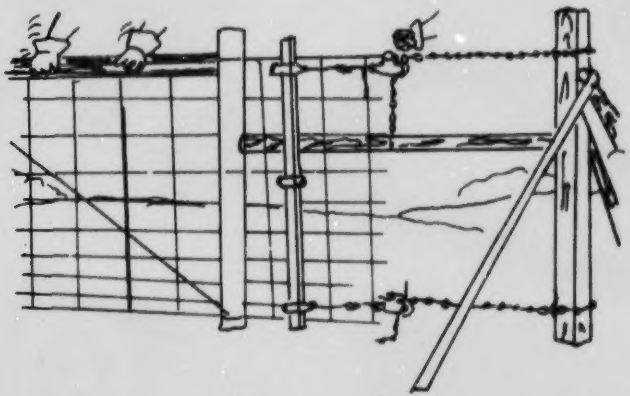


INFORMATION SHEET

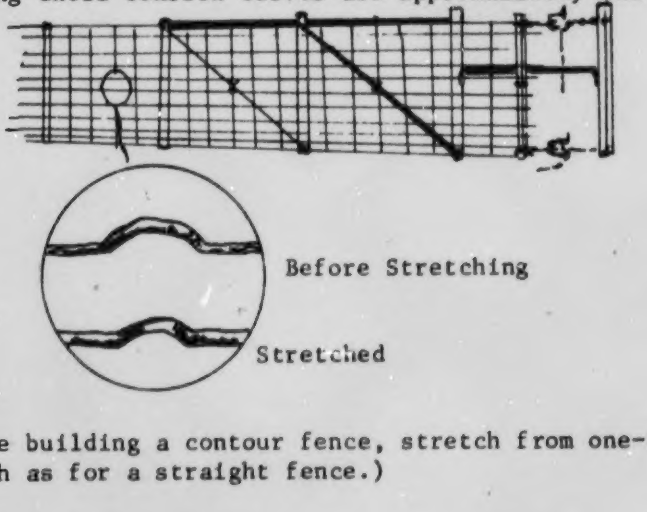
E. Attach rachets to clamp bar



F. Tighten fence slowly by turning top rachet, then lower rachet, alternating back and forth to maintain even wire tension at top and bottom



G. Continue stretching until tension curves are approximately one-third removed



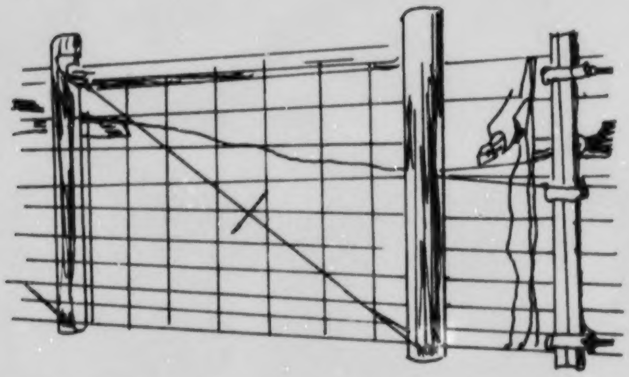
(Note: If you are building a contour fence, stretch from one-third to two-thirds as much as for a straight fence.)

INFORMATION SHEET

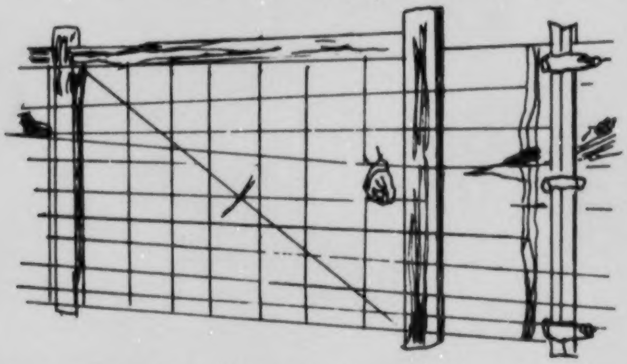
XVI. Attaching fence to second anchor post or brace-line post

A. Staple each line wire securely to anchor post

B. Remove stay wires a sufficient distance to extend around anchor post and wrap back on itself



C. Cut middle line wire, extend around post, and wrap back on itself



D. Repeat procedure with every other wire working toward top and bottom

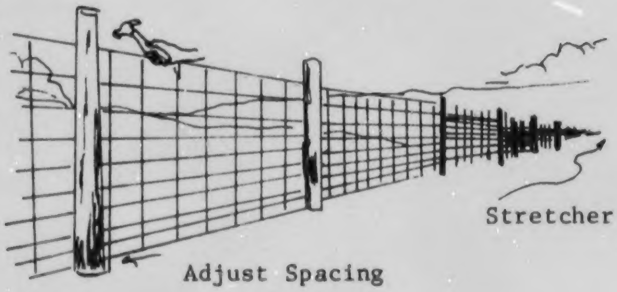
E. Cut and wrap remaining wires leaving top wire until last

INFORMATION SHEET

XVII. Attaching fence to line post

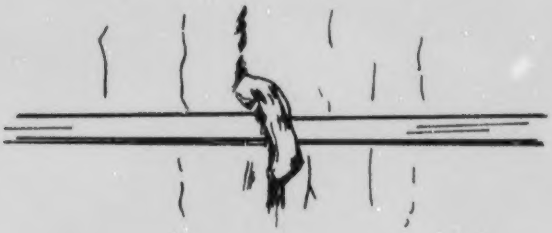
(Note: Begin at point farthest from stretcher.)

A. Attach top wire


Stretcher
Adjust Spacing

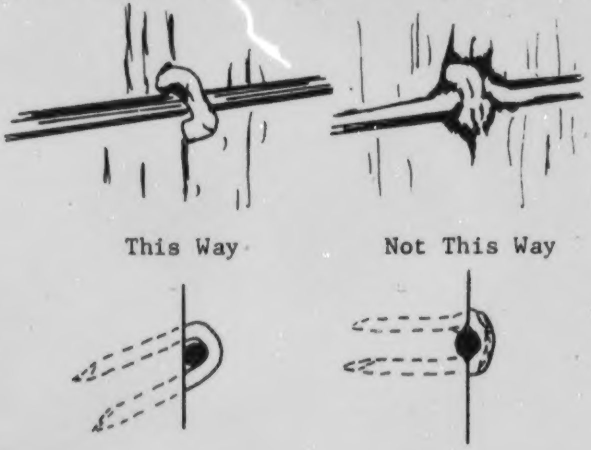
1. Wood posts

a. Set staple cross-wise of grain



b. Drive staple into post; wire should be held closely, not snugly or tightly

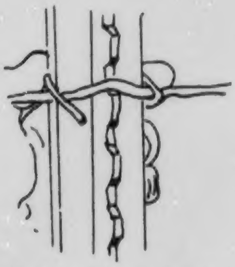
(Note: Do not bury staple into post, it damages the wire.)


This Way
Not This Way

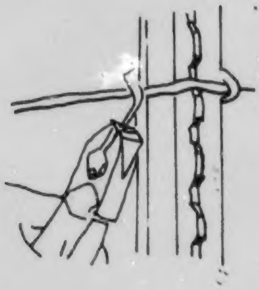
INFORMATION SHEET

2. Steel posts

   a. Hook post clamp over line wire and snap into position around post



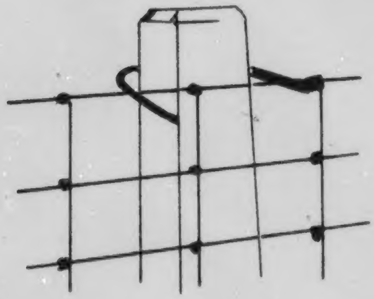
   b. Bend other side over line wire to form hook



3. Concrete posts

   a. Extend wire around post to form loop

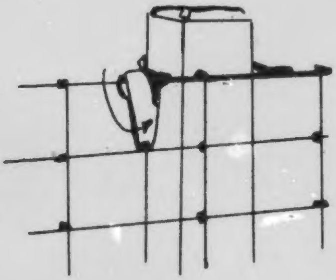
   (NOTE: Use twelve gauge galvanized wire or larger.)



   b. Cut wire ends to desired length for wrapping

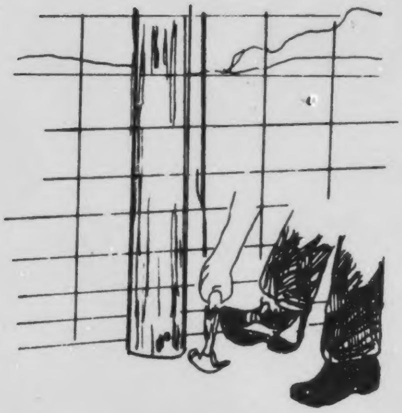
INFORMATION SHEET

c. Pull fence against post and wrap loop ends around line wire



B. Attach bottom wire

(NOTE: This can be done easily by putting your foot on bottom line wire to hold it in position until staple is driven into place.)



C. Attach every other wire on remainder of post

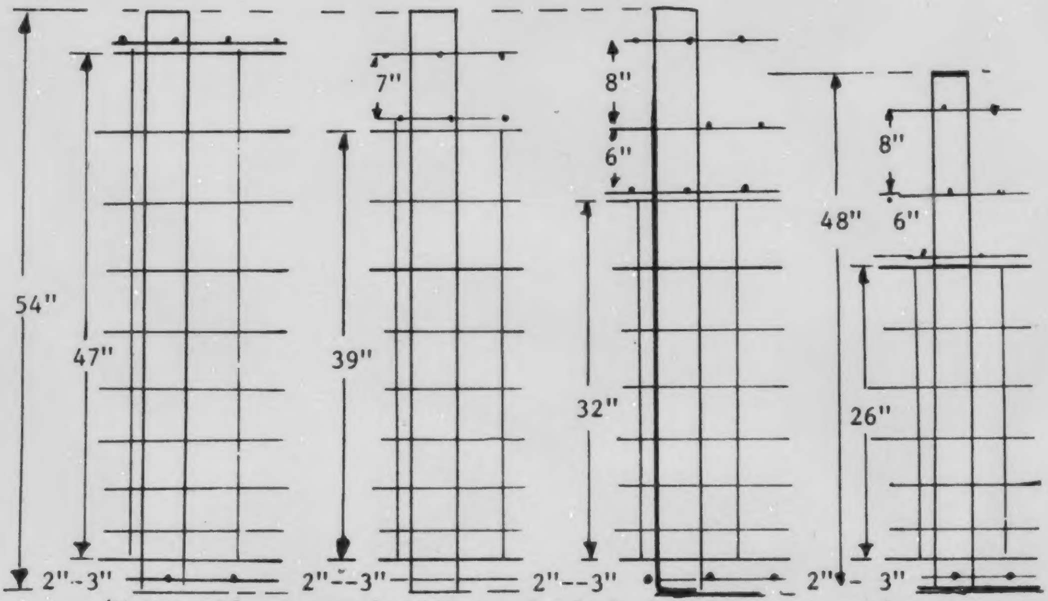
D. Attach fence to remaining post in the same manner

INFORMATION SHEET

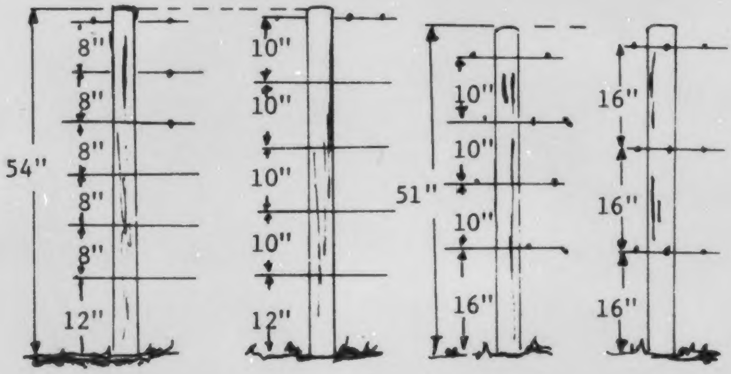
XVIII. Unrolling and stretching barbed wire

A. Mark position on anchor post where barbed wire is to be attached (Note: if you are using barbed wire under your fence, stretch and attach it first. Next, attach first barbed wire above woven wire. Continue with as many additional barbed wires as planned, working toward top of posts.)

Example:



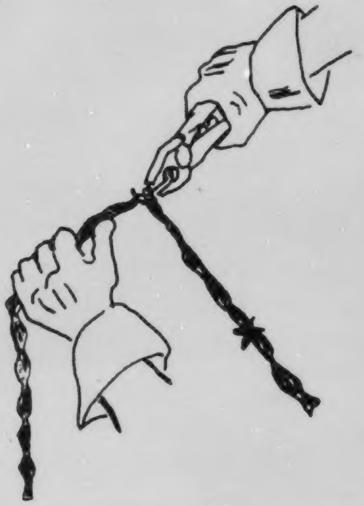
(Note: If you are building a barbed-wire fence, consider the spacing between lines and whether to start at the top or bottom of your post when stretching and attaching wire. You may want to start at top since the top wire will take most of the slack out of your anchor-and-brace assemblies so remaining wires will stay tight.)



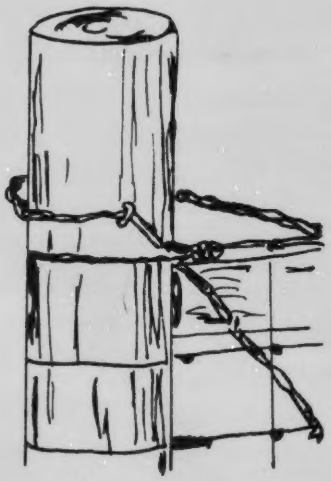
INFORMATION SHEET

B. For gate post, remove barbs on wire for sufficient length to wrap around anchor post and allow for splice

(NOTE: This avoids possibility of animal injury if anchor post is at a passageway.)

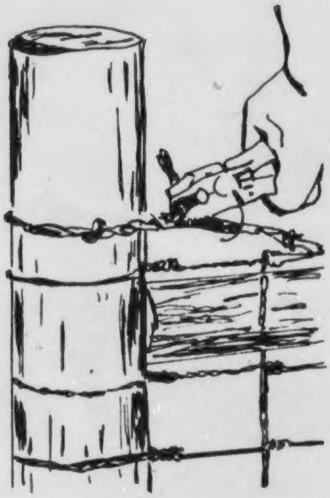


C. Staple wires in position



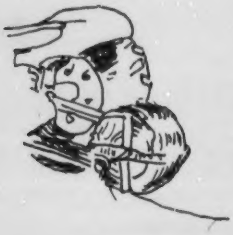
INFORMATION SHEET

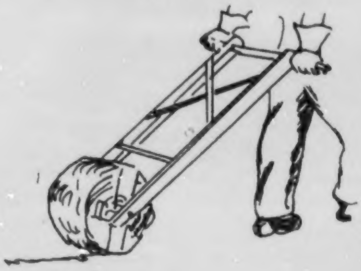
D. Extend wires around post and wrap

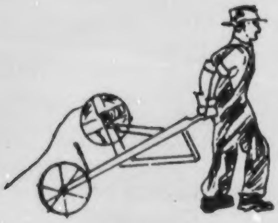


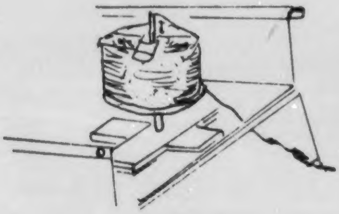
E. Unroll barbed wire to next anchor post

(NOTE: Do not loop wire off side of roll. This makes it difficult and dangerous to work and creates kinks.)





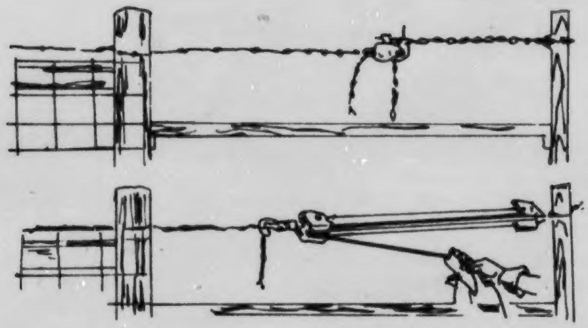




F. Attach rachet to dummy post

INFORMATION SHEET

G. Attach barbed wire to fence stretcher

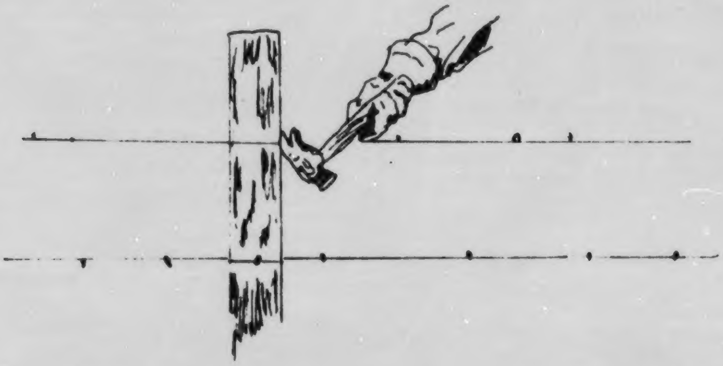


H. Stretch barbed wire until fairly tight

(NOTE: Barbed wires have no tension curves, so the strain is transferred directly to the anchor-brace assembly. A barbed-wire fence 40 rods long that has the wires stretched tightly when the temperature is 80 degrees will shorten three inches when the temperature drops to 20 degrees. It takes a well built anchor-brace-assembly to stand this kind of pull.)

I. Check wire to make sure it is free

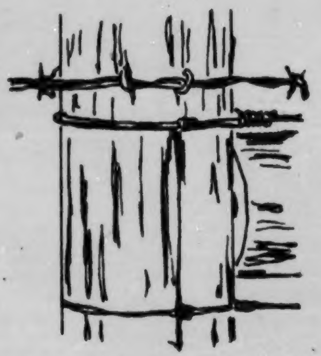
(NOTE: Use pliers or hammer to free wire. Avoid catching wire with hands. If stretched wire breaks, you could be severely cut.)



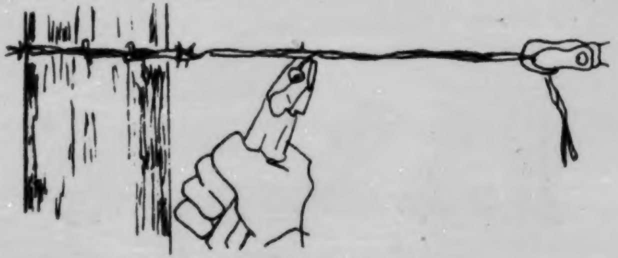
INFORMATION SHEET

J. Staple barbed wire to wood anchor post with two staples

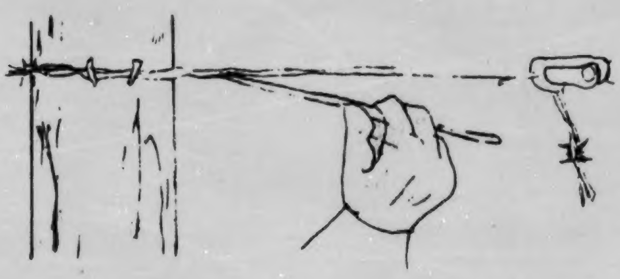
(Note: This applies to end of fence where stretchers are attached.)



K. Remove barbs on stretcher end of wire for sufficient length to wrap around anchor post and splice

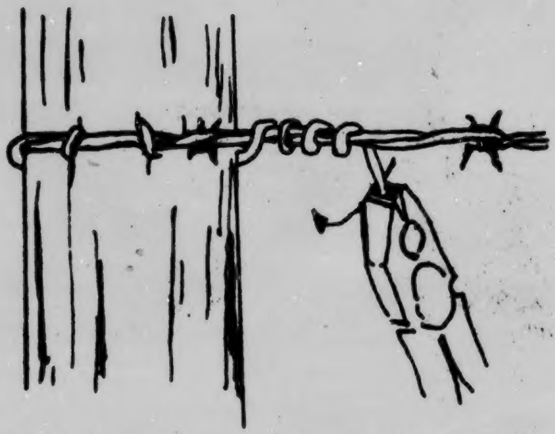


L. Cut one of the two wires where barbs have been removed and untwist

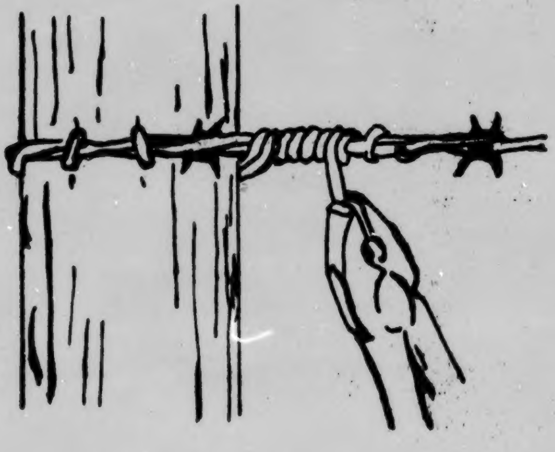


INFORMATION SHEET

M. Extend cut wire around anchor post and wrap leaving space between each wrap



N. Cut remaining wire, extend around post, and wrap in same manner; run second wire wraps between wraps of first wire



O. Attach remaining wires in the same manner

P. Attach wire to line post in a similar manner to that of woven wire

XIX. Reason fences should be grounded for lightning protection--Wire fences that are attached to trees or buildings are most likely to receive and carry lightning discharges, but any ungrounded wire fence with a wooden or steel post set in concrete is a hazard to livestock

(Note: Livestock are usually killed instantly when they are near a fence that receives a lightning discharge. Fences having all steel posts provide a good means of grounding fences in humid areas.

INFORMATION SHEET

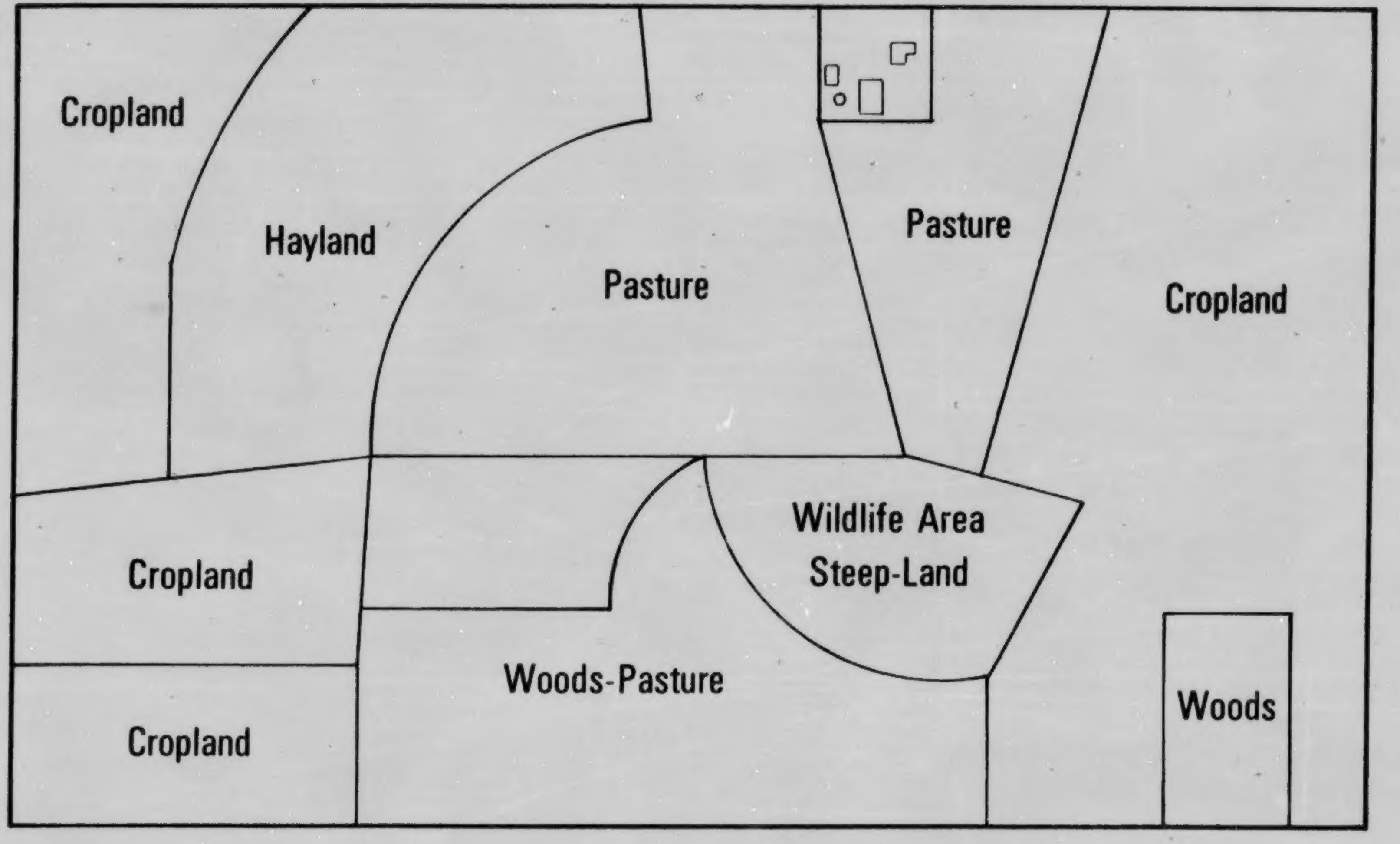
XX. Factors that determine the number and kind of line posts to use

- A. Area confinement of livestock
- B. Kind of fence to be used
- C. Anticipated life of fence
- D. Cost of setting post
- E. Kinds of post available
- F. Lightning protection needed
- G. Height of fence

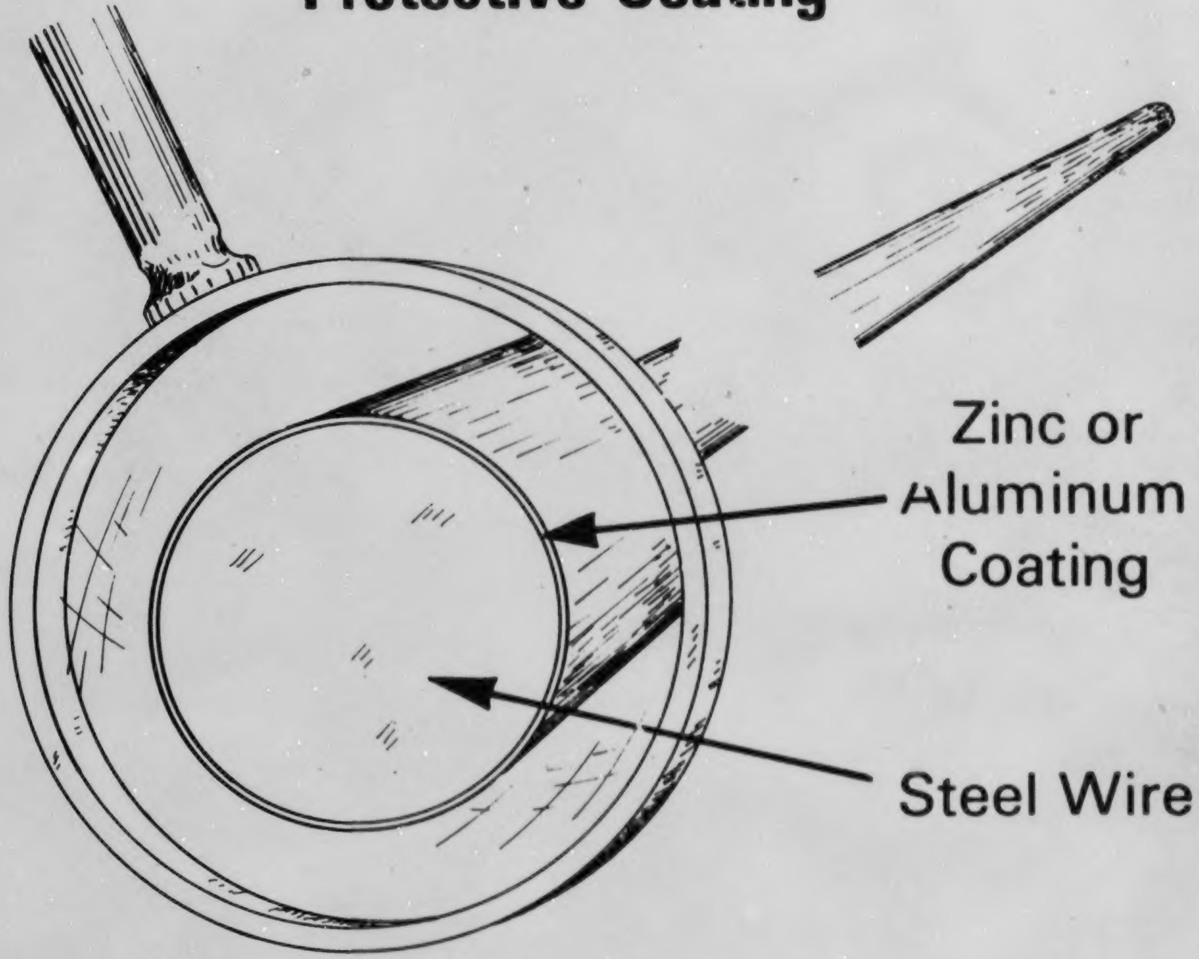
XXI. Tools and materials needed to construct farm fences (Transparency 4)

- A. Spade
- B. Wire splicer
- C. Rule or steel tape
- D. Claw hammer
- E. Sixteen foot gauge pole
- F. Carpenter's level
- G. Wire cutting pliers
- H. Five foot stakes
- I. Post hole digger
- J. Tamping bar
- K. Brace and bit
- L. Steel dowel
- M. Steel post driver
- N. Block and tackle with secure clamp
- O. Wire clamp
- P. Staples
- Q. Eighteen to 24 inch rod (for tightening brace wire)
- R. Handsaw
- S. Leather gloves

Laying Out Fields to Fit Land Capability


Cropland
Hayland
Pasture
Pasture
Cropland
Cropland
Wildlife Area
Steep-Land
Woods-Pasture
Woods
Cropland

Protective Coating


Zinc or
Aluminum
Coating
Steel Wire

Life of Wire According to Coating

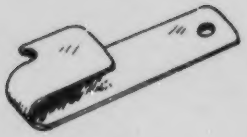
Minimum Weight of Coating on Zinc-Coated Wire Fencing (Furnished in 20-Rod Rolls)

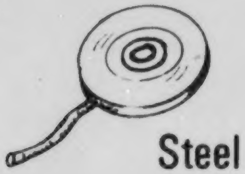
Size, Steel Wire Gage	Nominal Diameter of Zinc-Coated Wire, in.	Minimum Weight of Coating, oz. per sq. ft. of Uncoated Wire Surface		
		Class 1	Class 2	Class 3
No. 7	0.177	0.40	0.60	0.80
No. 9	0.148	0.40	0.60	0.80
No. 10	0.135	0.30	0.50	0.80
No. 11	0.120	0.30	0.50	0.80
No. 12	0.105	0.30	0.50	0.80
No. 12 1/2	0.099	0.30	0.50	0.80
No. 14 1/2	0.076	0.20	0.40	0.60

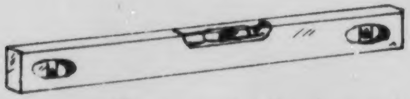
Approximate Protection Given Wire by Class 1 and Class 3 Galvanizing

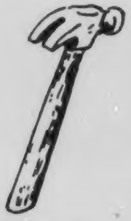
Wire Size	Years till rust appears					
	Climatic condition					
	Dry		Humid		Coastal & industrial	
	Class		Class		Class	
	1	3	1	3	1	3
9	15	30	8	13	3	6
11	11	30	6	13	2	6
12 1/2	11	30	6	13	2	6
14 1/2	7	23	5	10	1.5	4.5

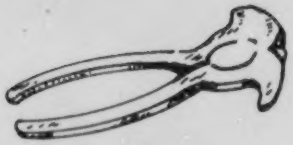
Tools and Materials Used in Fencing

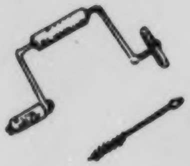

Wire Splicer

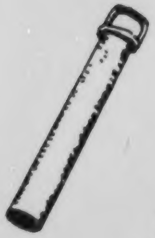

Steel Tape

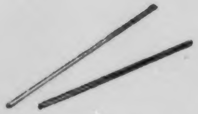

Carpenter's Level

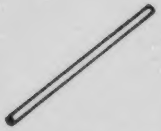

Claw Hammer

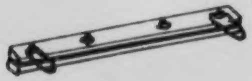

Wire Cutting Pliers

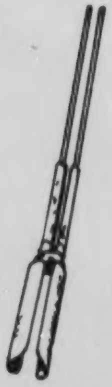

Brace & Bit

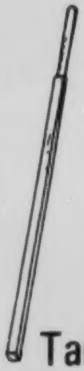

Steel Post Driver

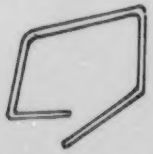

Steel Dowels

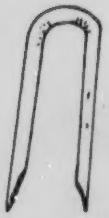

18"-24" Rod

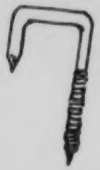

Woven Wire Clamp

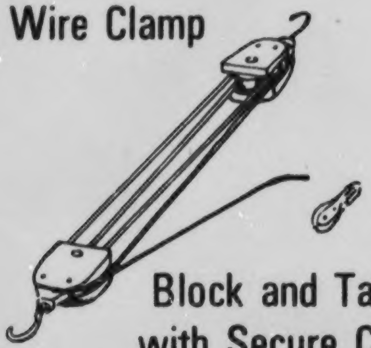

Post-Hole Digger


Tamping Bar


Wire Clamp


U-Staple


L-Staple


Block and Tackle
with Secure Clamp

BUILDING FARM FENCES
UNIT I

ASSIGNMENT SHEET #1--DETERMINE THE COST OF FENCES

Contact your local dealer and determine the cost of constructing one-fourth mile of pasture fence when using the various type materials listed below. After the completion of this exercise, turn in to instructor for his evaluation.

1. Anchor-and-brace assembly

   (NOTE: Fence is 1620 feet (80 rods) long.)

   a. 6" treated corner post

      1) Number needed________

      2) Cost each_______

      3) Total cost_______

   b. 5" treated end post

      1) Number needed_________

      2) Cost each_______

      3) Total cost______

   c. 4" treated brace post

      1) Number needed_______

      2) Cost each_______

      3) Total cost______

   d. 9 gage smooth galvanized wire

      1) Cost per pound_________

      2) Total cost_______

   e. Steel dowels

      1) Number needed_______

      2) Cost each______

      3) Total cost________

   f. Total cost of anchor-and-brace assemblies_______________

ASSIGNMENT SHEET #1

2. Fence line post (12' spacing)

   a. Number of line post needed______

      1) Cost of treated 3" wood post______each

      2) Cost of untreated 3" wood post______each

      3) Cost of 6 1/2 foot "U" type steel post______each

      4) Cost of 6 1/2 foot "T" type steel post______each

      5) Cost of 4" concrete post______each

   b. Total cost of line post______

   (NOTE: Select the type post you would use on your farm. Consider cost, life, labor involved, and appearance.)

3. Cost of wire

   a. 32" woven wire with 3 strands of 12 1/2 gage on top of woven wire

   (NOTE: Woven wire has 10 gage top and bottom wire and 12 1/2 gage filler wires.)

      1) Cost of woven wire______

      2) Cost of barbed wire (Use U.S. Steel wire.)

         a) Cost per roll______

         b) Number rolls needed______

         c) Total cost of barbed wire______

      3) Total cost of 1) and 2) = ____________

   b. Five strands of 12 1/2 gage barbed wire (U.S. Steel wire)

      1) Number of rolls needed______

      2) Cost per roll______

      3) Total cost of barbed wire______

   c. Total cost of wire____________

   (NOTE: Select the kind of wire you would use on your home farm.)

ASSIGNMENT SHEET # 1

4. Cost of staples or fasteners

   a. Cost per pound for "U" shaped staples________

   b. Cost per pound for "L" shaped staples________

   c. Cost per pound for wire fasteners____________(Used for steel post)

   d. Cost per pound for 12 gage wire used for fastening concrete post__________

   e. Pounds needed in fastening 5 strands of barbed wire_________

   f. Pounds needed in fastening woven wire and 3 strands of barbed wire_________

   g. Total cost of staples or fence fasteners_________

   (NOTE: Select the kind of fastener that you would use according to the post and wire that you have selected.)

5. Cost of constructing 1/4 mile of fence

   a. Cost of anchor and brace assembly_________

   b. Cost of line post_________

   c. Cost of wire_________

   d. Cost of staples or fasteners_________

   e. Other cost_________

   f. Total cost of constructing fence_________

BUILDING FARM FENCES
UNIT I

JOB SHEET #1--CONSTRUCT THE WOOD ANCHOR-AND-BRACE ASSEMBLY

I. Tools and materials needed

A. Post-hole digger or post auger

B. Tamping bar

C. Spade

D. Brace and bit

E. Two steel dowels

F. Eighteen to 24 inch rod or strong stick

G. Approximately 40' of 9 gage smooth galvanized wire

H. Wire cutting pliers

I. Claw hammer

J. Carpenter's level

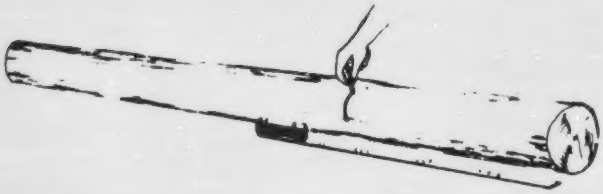
K. Six foot rule or steel tape

L. Wire splicer

M. Staples

II. Procedure

A. Mark ground line on anchor-and-brace post

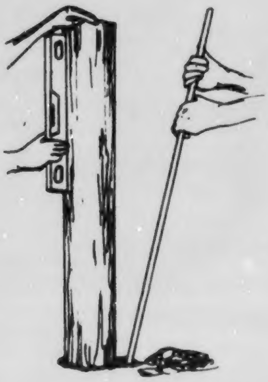


B. Dig hole for anchor post -Post depth should be at least 3 feet 6 inches

JOB SHEET #1

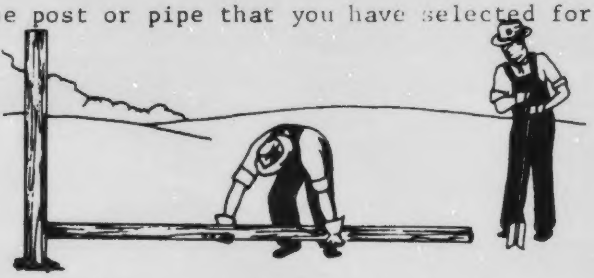
C. Place post in hole and tamp thoroughly from bottom to top

(NOTE: Replace small amount of soil as you tamp and check occasionally to see that it is in proper alignment.)



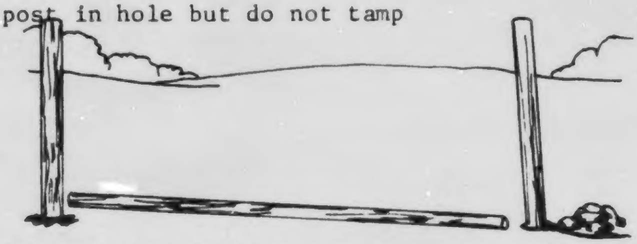
D. Measure from anchor post to first brace post

(NOTE. Use post or pipe that you have selected for horizontal brace.)

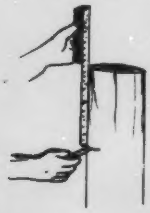


E. Dig a hole for brace post 3 feet, 6 inches deep

F. Place brace post in hole but do not tamp



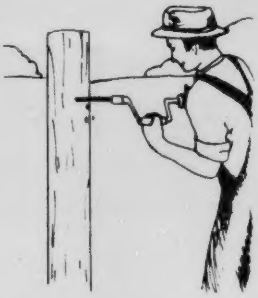
G. Mark hole for dowel 8 to 12 inches from top of anchor post



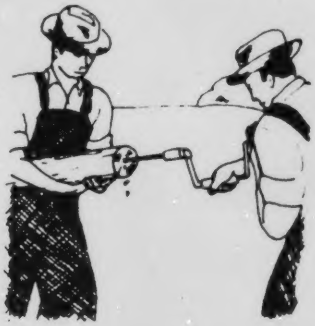
JOB SHEET #1

H. Bore hole same size as dowel, 2 inches deep

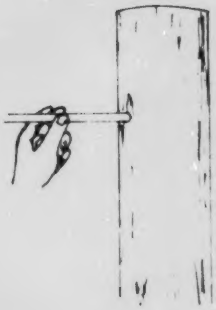
(NOTE: Be sure to remove all shavings. If using pipe or angle iron brace, notch about one-half inch deep.)



I. If using wood brace, bore same size holes to same depth in each end of brace

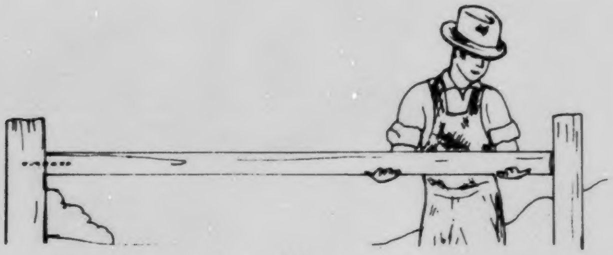


J. Insert dowel in post

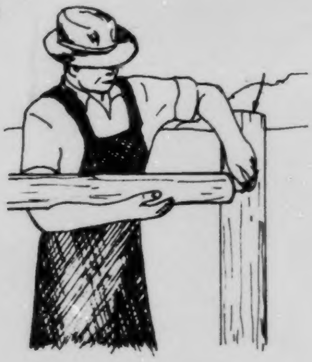


JOB SHEET #1

K. Install brace member on anchor post--Position opposite end on brace post so brace member is parallel to ground line



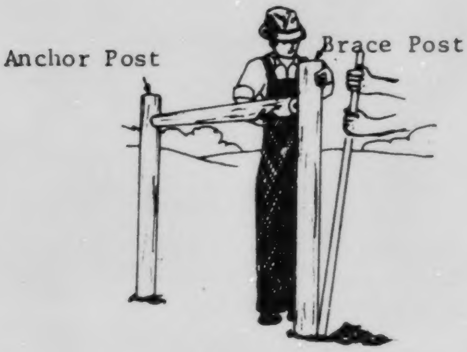
L. Mark hole for dowel in brace post



M. Bore hole in brace post same size as steel dowel, 2 inches deep

N. Insert dowel in brace post

O. Install brace member between anchor post and brace post

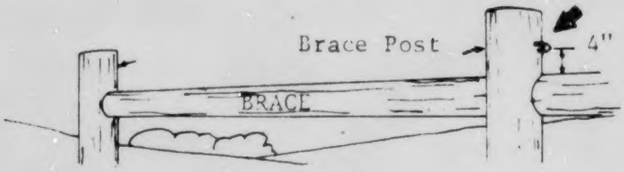


P. Replace soil around brace post and tamp

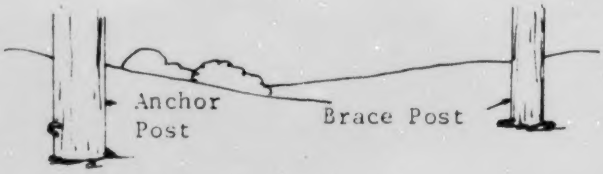
Q. If you are using a two or three brace assembly, repeat steps "D" through "P"

JOB SHEET #1

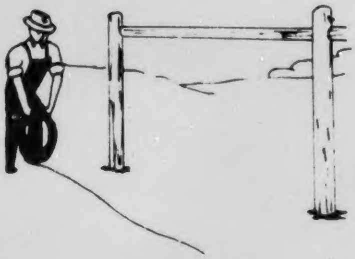
R. Drive staple about half its length into brace post about 4 inches above brace member on opposite side


Brace Post
4"
BRACE

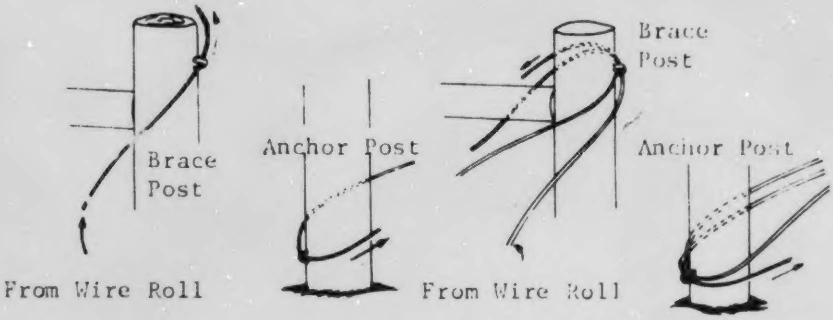
S. Drive staple in a similar manner in anchor post about 4 inches from ground line, opposite side from brace


Anchor Post
Brace Post

T. Unroll enough brace wire for two complete loops around anchor and brace posts



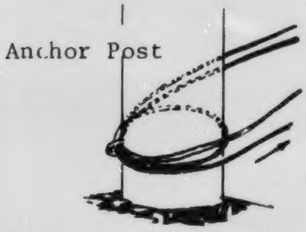
U. Thread end of brace wire through one staple then, through the other--Repeat to form four wire strands


Brace Post
Anchor Post
From Wire Roll
Brace Post
Anchor Post
From Wire Roll

V. Remove rough slack from wire

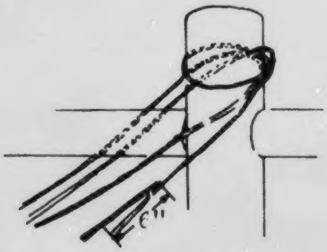
JOB SHEET #1

W. Wrap wire around anchor post and return toward brace post

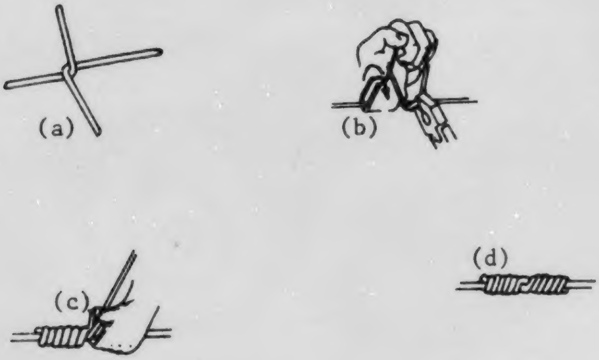


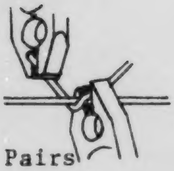
(NOTE: Leave enough wire length so end extends about two-thirds of the way back to brace post.)

X. Cut brace wire from roll allowing enough wire to wrap around brace post and extend 6 to 12 inches past other wire end



Y. Make splice as shown in drawing below

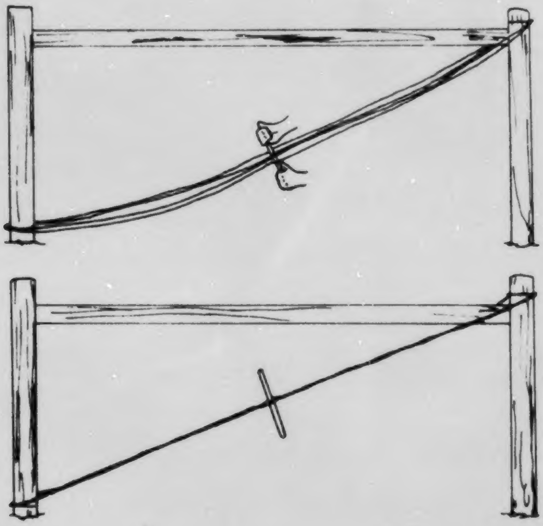




Splice Can Be Made With Two Pairs of Pliers

JOB SHEET #1

Z. Twist brace wire until whole assembly is rigid



(NOTE: Use a strong stick, rod, or pipe approximately eighteen to twenty-four inches long. As wire is tightened, tap with hammer where it wraps around post so it will fit smoothly and remain tight.)

BUILDING FARM FENCES
UNIT I

TEST

1. Match the terms on the right with the proper definition.

_____a. Wires between the top and bottom line wires

_____b. Used for cross or boundary fencing on cattle ranges

_____c. Spring effect that is present in woven wire

_____d. Fence left in the same location for several years; under normal conditions the fence will exert 3000 to 4500 pounds pull on the anchor-and-brace assembly

_____e. Vertical wires that tie the line wires together

_____f. Intended to stay in one location for only a few weeks

_____g. Wires that run lengthwise

_____h. Fastener used on steel post

_____i. Fastener used on wood post

_____j. Product used to treat wood to increase life

1. Staple
2. Wood preservative
3. Line wires
4. Permanent fence
5. Movable fence
6. Stay wires
7. Filler wires
8. Suspension fences
9. Tension curve
10. Wire clip

2. Select the proper factors to consider when planning the location and arrangement of farm fences. Place an "X" by the proper factors.

_____a. Consider coordinating native pastures to cropping plans

_____b. Consider land capability

_____c. Arrange fields and passageways for convenience and labor savings

_____d. Always build permanent fences first

_____e. Relate fences to soil conservation practices

3. Arrange in order the proper procedure to follow in planning the fencing layout on a farm by numbering the steps below. (Place number to the left of each step.)

    _____a. Divide the farm into areas best suited to:

        1) Permanent pastures or hay production

        2) Woodlands not pastured

        3) Woodlands pastured

        4) Cultivated areas

    _____b. Divide each area into the number and size of fields needed for specific types of cropping systems as related to land capability

    _____c. Sketch layout of farm

    _____d. Indicate gates and other passageways

        1) If possible, locate gates and passageways for livestock and equipment in the corner of each field closest to the buildings

        2) If fields are on opposite sides of the highway, place gates directly opposite each other

    _____e. Sketch proposed lane to connect farm building with permanent pastures

4. List four kinds of temporary and permanent pasture fences.

    a.

    b.

    c.

    d.

5. Name four factors that influence the kind of fence to build.

    a.

    b.

    c.

    d.

6. Select the advantages and disadvantages of electric fences by placing an "X" by the correct statement.

   ______a. Requires full time operation for maximum effectiveness

   ______b. Not necessary to train livestock as with other types of fences

   ______c. Expensive to operate

   ______d. Use of low-cost, simple fencing materials and methods

   ______e. Fence is very effective in dry weather

   ______f. Protects and extends the usefulness of old permanent fences

   ______g. Difficult to build and remove

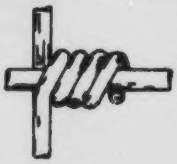
7. Name two factors that determine fence life.

   a.

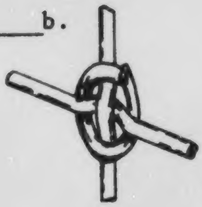
   b.

8. Distinguish between a hinge joint and a stiff-stay joint by placing the correct term by the illustrations below.

   ___________a.



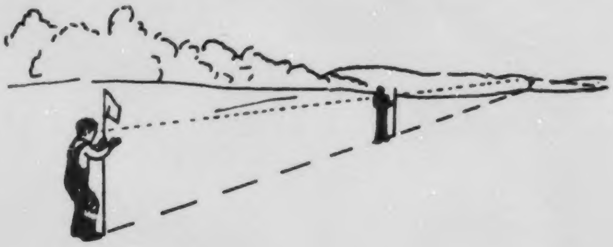
   ___________b.



9. Arrange in order the steps to follow when constructing a fence in: a. Open level areas, b. Open rolling areas, c. Areas with heavy undergrowth, and d. Contour areas. (Place number to the left of each step. Starting on next page.)

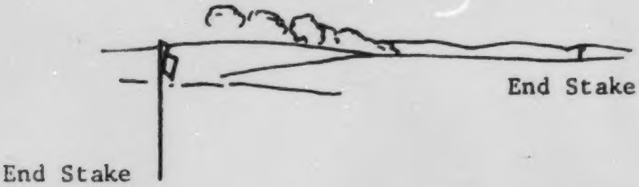
a. Open level areas

_____1) Proceed about 100 feet towards other end, align the posts

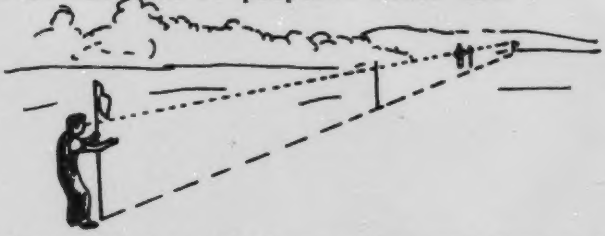


_____2) Station someone at one of the end stakes to help with alignment of remaining stakes

_____3) Continue setting additional stakes about every 100 feet until complete fence line is staked



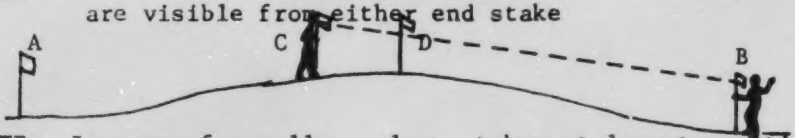
_____4) Set stake at each end of proposed fence line



_____5) Proceed about 100 feet further and set another stake even with all three stakes

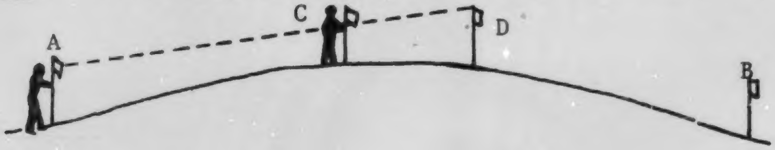
b. Open rolling areas

_____1) Place two stakes about ten feet apart on top of hill so both are visible from either end stake

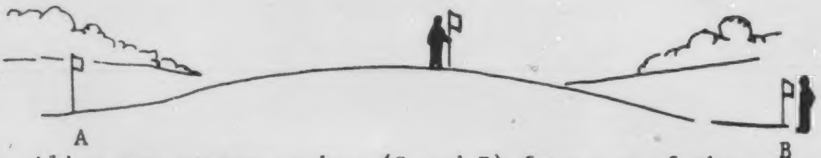


(NOTE: In case of a valley, place stakes at lowest position in valley.)

_____2) Check alignment of center stakes from other end stakes



_____3) Set stake at each end of proposed fence line



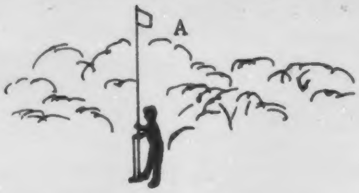
_____4) Align two center stakes (C and D) from one of the end stakes

c. Areas with heavy undergrowth

_____1) Clear area between stakes "B" and "C" and some distance beyond stake "C"

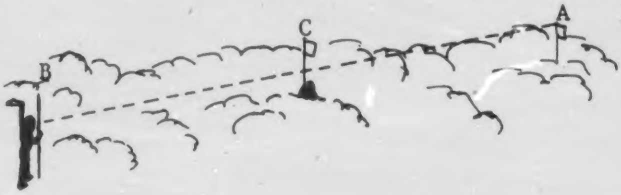
_____2) Establish another stake in the same manner working until line is completely established

_____3) Mount a 12 to 15 foot pole at end of fence line with heaviest growth



_____4) Place stake at other end of fence line

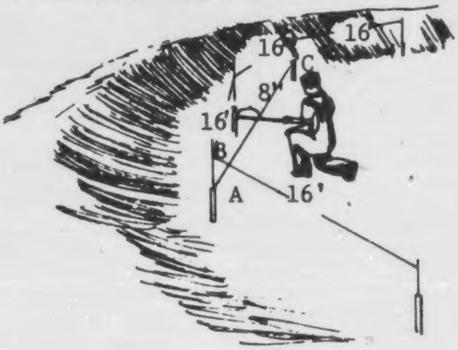
_____5) While sighting from short end, stake "B" to pole "A" at other end; align second stake "C" as far inside thicket as it can be seen



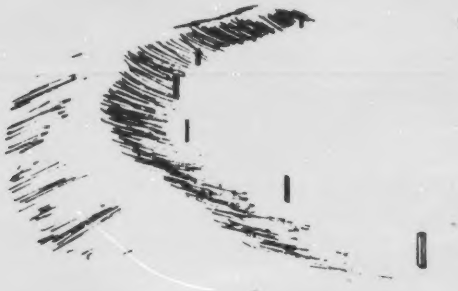
_____6) Check pole or pipe with level to make sure it is vertical

d. Contour areas

_____1) Measure distance from center "B" stake to string



_____2) Stake out smooth curve along contour strip or terrace



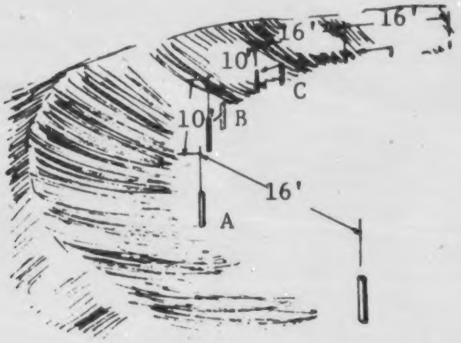
_____3) Decrease post spacing if measurement is more than four inches

_____4) If there is excessive curve at any one point, select three stakes at point of greatest curvature

_____5) Stretch string between first "A" and third "C" stakes

_____6) Repeat steps three to six any place there appears to be surplus curvature

_____7) Set stakes to attain proper spacing



_____8) Check to see that no single post is out of line with the curve

10. Match the illustrations (on the next page) with the proper explanation.

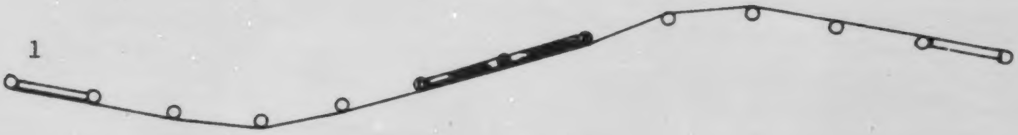
_____a. Straight fences on rolling land

_____b. Straight fences up to 10 rods in length

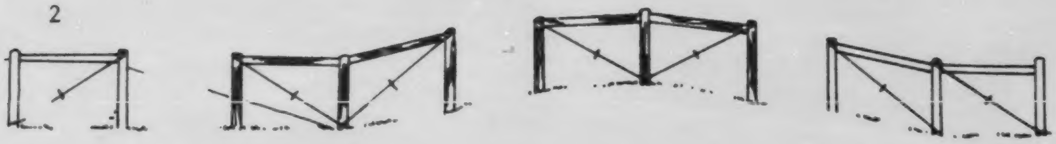
_____c. Contour fences

_____d. Straight fences 10 to 40 rods in length _____e. Straight fences more than 40 rods in length

1



2



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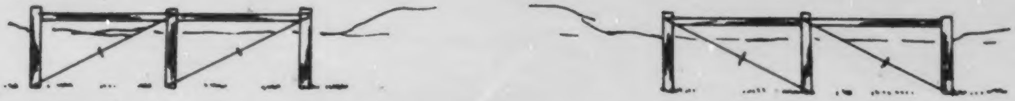

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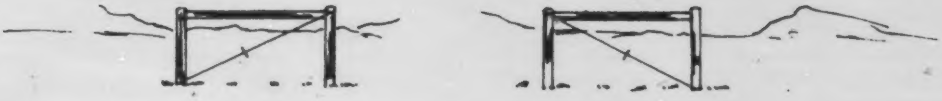

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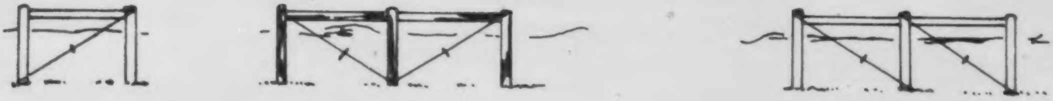
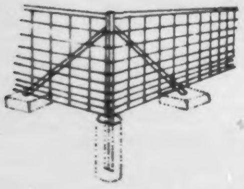
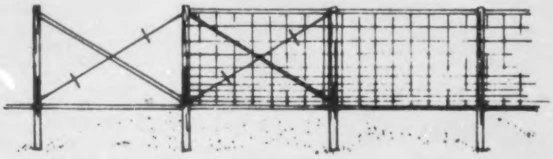


11. Select from the illustrations below the proper and improper methods of bracing ends and corners. Place "I" by improper methods and "P" by proper methods.

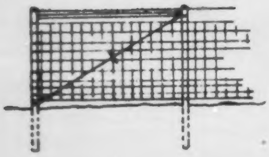
a.______



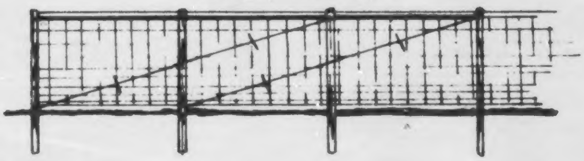
b.______



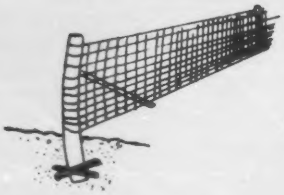
c.______



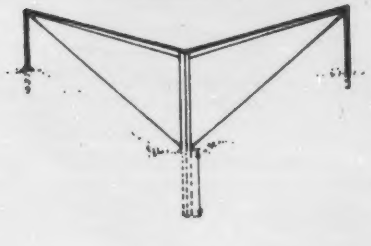
d.______



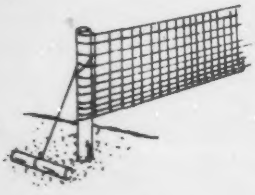
e. ______



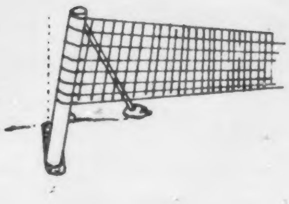
f.______



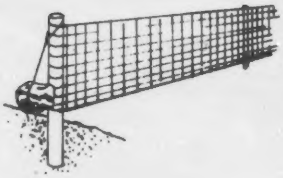
g.______



h.______

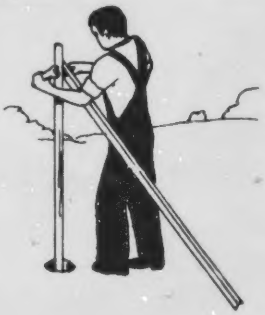


i.______

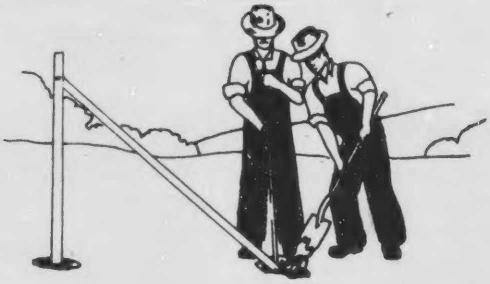


12. Indicate the proper steps for constructing the steel anchor-and-brace assembly by numbering the steps below in proper order.

_____a. Attach brace to anchor post

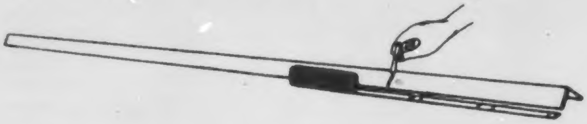


_____b. Place concrete for brace pier--Tamp concrete as it is placed

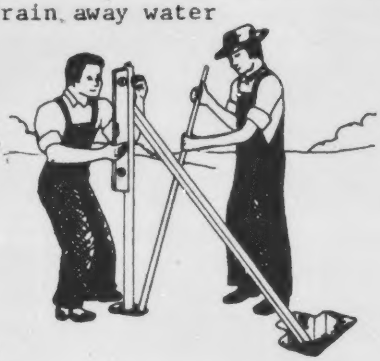


_____c. Dig anchor post hole 12 inches in diameter and 3 1/2 feet deep

_____d. Mark ground line on post with chalk



_____e. Mix and place concrete around anchor post--Slope concrete away from post to drain away water



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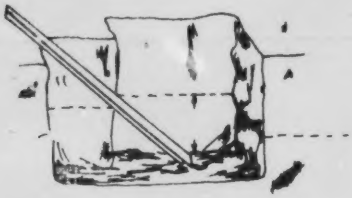
_____f. Dig hole where brace contacts ground

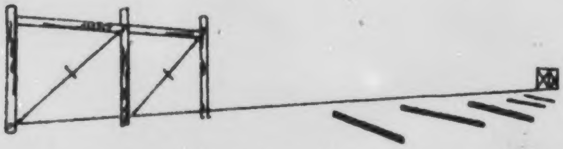


13. Indicate the steps for setting line post by numbering the steps below in the proper order.

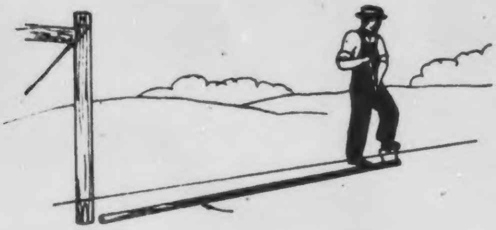
_____a. Dig or bore hole for post

_____b. Mark ground line on post or digging tool with chalk or crayon

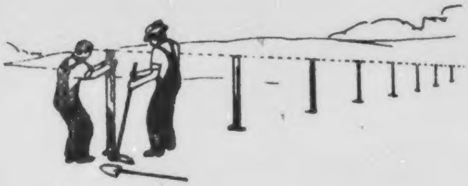
_____c. Stretch cord, rope, or strand of barbed wire between two anchor post assemblies



_____d. Measure line post spacing with gauge pole

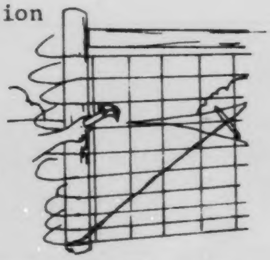


_____e. Align post as dirt is backfilled into hole

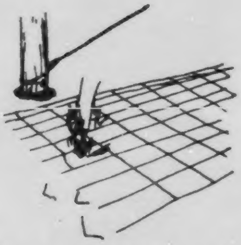


14. Arrange the steps for placing a woven fence for stretching by numbering the explanations below in proper order.

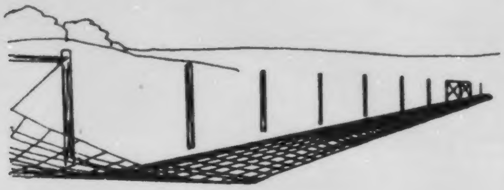
_____a. Staple fence into position



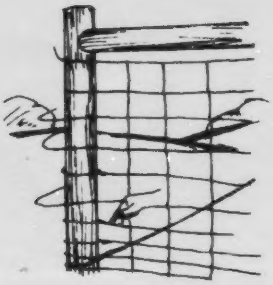
_____b. Remove one stay wire from top to bottom



_____c. Complete unrolling of fence to next anchor post assembly



_____d. Extend each line around post and wrap wire on itself



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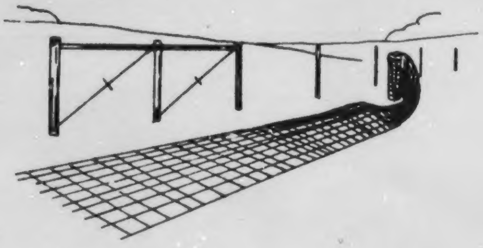
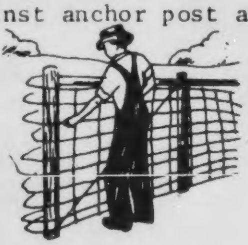
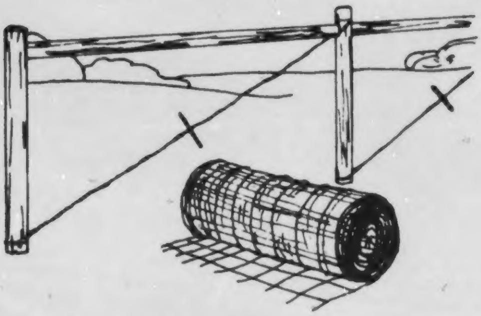
_____e. Starting ahead of anchor post (at least two feet), unroll fence one or two line post spacings and set on end



_____f. Stand fence against anchor post and adjust to desired height

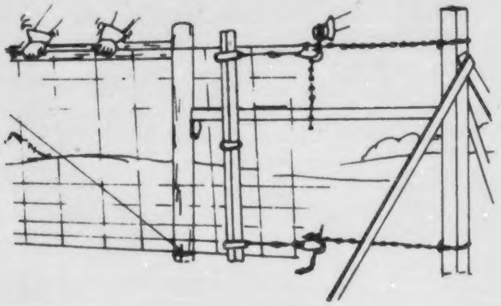


_____g. Examine fence roll to determine from which end of the line fence should be unrolled

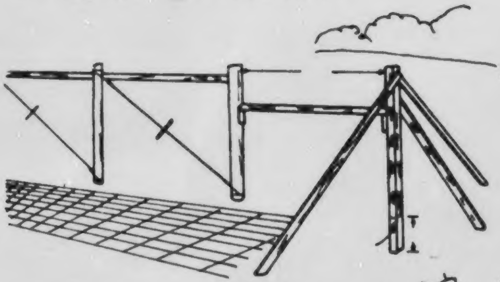


15. Arrange in the proper order the steps to follow when stretching a woven fence.

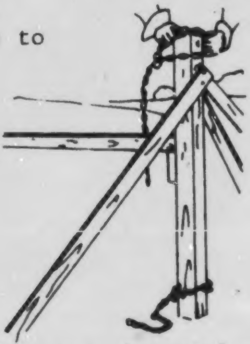
_____a. Tighten fence slowly by turning top rachet, then lower rachet, alternating back and forth to maintain even wire tension at top and bottom



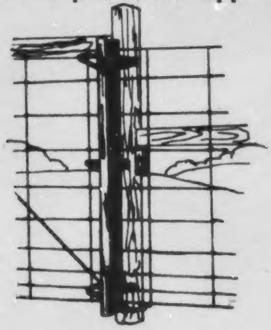
_____b. Erect dummy post for attaching stretchers



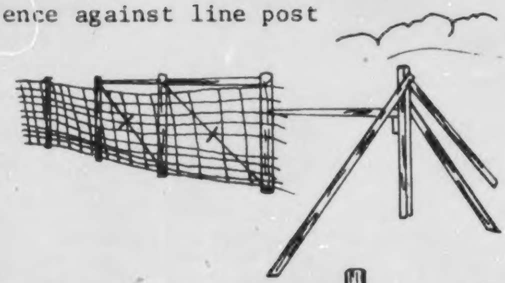
_____c. Attach chain (or cable) of stretchers to dummy post



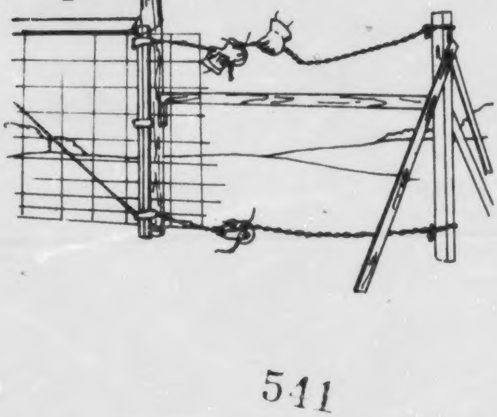
_____d. Attach clamp bar to fence at a position opposite anchor post



_____e. Stand fence against line post

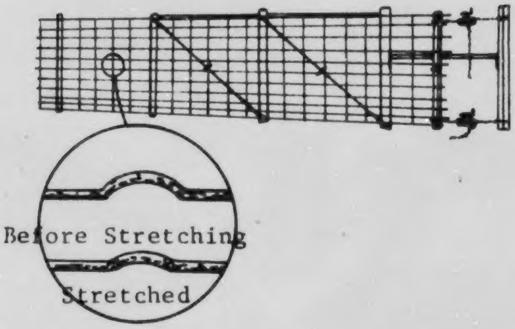


_____f. Attach rachets to clamp bar



(Continued on next page.)

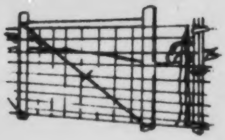
_____g. Continue stretching until tension curves are approximately one-third removed



16. Arrange in the proper order the steps for attaching a woven fence to the second anchor post or brace-line post.

_____a. Repeat procedure with every other wire working toward top and bottom

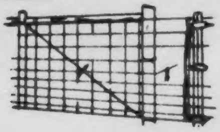
_____b. Remove stay wires a sufficient distance to extend around anchor post and wrap back on itself



_____c. Cut and wrap remaining wires leaving top wire until last

_____d. Staple each line wire securely to anchor post

_____e. Cut middle line wire, extend around post, and wrap back on itself



17. Select the correct procedure for attaching a fence to line post. Place "X" by each statement that is correct.

_____a. Attach bottom wire first

_____b. Set staple cross-wise of grain

_____c. Drive staple into post very tightly

_____d. A special post clamp is used when attaching fence to steel post

_____e. Use concrete staple to fasten fence to concrete post

18. Arrange in the proper order the steps used in unrolling and stretching barbed wire.

_____a. Attach remaining wires in the same manner; attach wire to the line post in similar manner to that of woven wire

_____b. Staple wires in position on wood post; extend wires around post and wrap

_____c. Mark position on anchor post where barbed wire is to be attached; for gate post, remove barbs on wire for sufficient length to wrap around anchor post and allow for splice

_____d. Stretch barbed wire until fairly tight; check wire to make sure it is free

_____e. Unroll barbed wire to next anchor post

_____f. Cut one of the two wires where barbs have been removed and untwist; extend cut wire around anchor post and wrap leaving space between each wrap

_____g. Attach rachet to dummy post; attach barbed wire to fence stretcher

_____h. Staple barbed wire to wood anchor post with two staples; remove barbs on stretcher end of wire for sufficient length to wrap around anchor post and splice

_____i. Cut remaining wire, extend around post, and wrap in same manner; run second wire wraps between wraps of first wire

19. Explain in writing why a fence should be grounded for lightning protection.

20. Name three factors that determine the number and kind of line post to use.

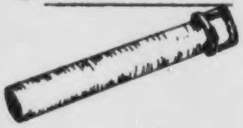
a.

b.

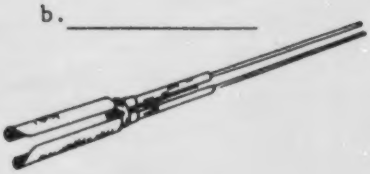
c.

21. Identify the following tools and materials that are used in constructing farm fences.

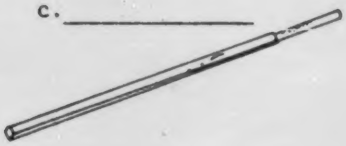
a.______________



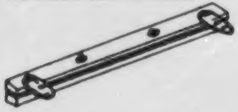
b.______________



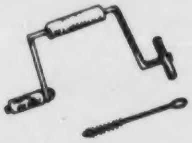
c.______________



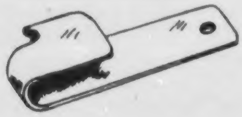
d.______________



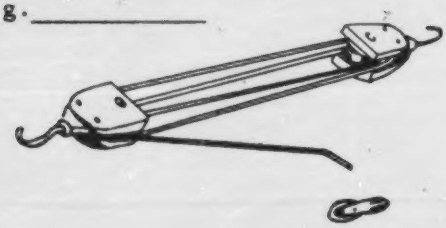
e.______________



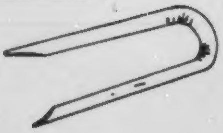
f.______________



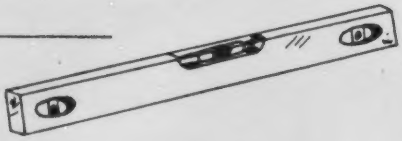
g.______________



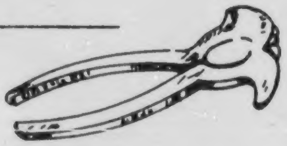
h. ______________



i. ______________



j. ______________



22. Determine the cost of constructing various type fences.

23. Demonstrate the ability to construct a wood anchor-and-brace assembly.

    (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity should be completed.)

24. Name two safety factors to consider in fencing.

    a.

    b.

BUILDING FARM FENCES
UNIT I

ANSWERS TO TEST

1. a. 7

   b. 8

   c. 9

   d. 4

   e. 6

   f. 5

   g. 3

   h. 10

   i. 1

   j. 2

2. b

   c

   e

3. a. 2

   b. 3

   c. 1

   d. 5

   e. 4

4. a. Woven fence

   b. Barbed wire

   c. Electric fence

   d. Combination of above

5. Any four of the following:

   a. Kind of livestock to be fenced

b. Combination of different kinds of livestock in the same field

c. Frequency livestock are checked

d. Necessity to fence out dogs or wolves

e. Size of area in which animals are confined

f. Money available for fencing

g. Estimated life of fence

6. a

d

f

7. Any two of the following:

a. Kind of protective coating

b. Thickness of protective coating

c. Size of wire

d. Type of steel in wire

8. a. Hinge joint

b. Stiff-stay joint

9. a. 1) 3

2) 2

3) 5

4) 1

5) 4

b. 1) 2

2) 4

3) 1

4) 3

c. 1) 5

2) 6
3) 1
4) 3
5) 4
6) 2

d. 1) 4
2) 1
3) 5
4) 2
5) 3
6) 7
7) 6
8) 8

10. a. 2
b. 4
c. 1
d. 3
e. 5

11. a. P
b. P
c. P
d. P
e. I
f. P
g. I
h. I
i. I

12. a. 3
    b. 6
    c. 2
    d. 1
    e. 5
    f. 4
13. a. 4
    b. 3
    c. 1
    d. 2
    e. 5
14. a. 5
    b. 3
    c. 7
    d. 6
    e. 2
    f. 4
    g. 1
15. a. 6
    b. 1
    c. 3
    d. 4
    e. 2
    f. 5
    g. 7

16. a. 4

    b. 2

    c. 5

    d. 1

    e. 3

17. b

    d

18. a. 9

    b. 2

    c. 1

    d. 5

    e. 3

    f. 7

    g. 4

    h. 6

    i. 8

19. Wire fences that are attached to trees or buildings are most likely to receive and carry lightning discharges, but any ungrounded wire fence with wooden post, or steel post set in concrete, is a hazard to livestock.

20. Any three of the following:

    a. Area confinement of livestock

    b. Kind of fence to be used

    c. Anticipated life of fence

    d. Cost of setting post

    e. Kinds of post available

    f. Lightning protection needed

    g. Height of fence

21. a. Steel post driver
    b. Post hole diggers
    c. Tamping bar
    d. Woven wire clamp
    e. Brace and bit
    f. Wire splicer
    g. Block and tackle with secure clamp
    h. Staple
    i. Carpenter's level
    j. Wire cutting pliers

22. Evaluated to the satisfaction of the instructor

23. Performance skills will be evaluated to the satisfaction of the instructor

24. a. Protective clothing
    b. Proper positions when stretching, nailing, and fastening wire

RAFTER FRAMING
UNIT II

TERMINAL OBJECTIVES

After completion of unit II, the student should be able to identify the parts of a steel framing square and be able to interpret the various tables found on the square. Using this information the student should be able to lay out common rafters. The student should be able to score eighty-five percent on a post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define five terms associated with rafter cutting.
2. Identify the parts of a framing square.
3. Identify the various tables found on the framing square and name one use of each.
4. Identify five types of roofs from an illustration.
5. Identify four kinds of rafters when given a drawing illustrating the various kinds.
6. Name the three methods of determining the length of common rafters.
7. Demonstrate the ability to lay out and cut common rafters.

RAFTER FRAMING
UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and Job Sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Students:

1. Read objective sheet
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the Job Sheet
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
   - TM 1--Parts of Roof
   - TM 2--Parts of Steel Framing Square
   - TM 3--Framing Square Tables
   - TM 4--Types of Roofs
   - TM 5--Kinds of Rafters
   - TM 6--Cutting a Rafter
4. Job Sheet
   - #1--Lay Out and Cut Common Rafter by the Stepping Method
   - #2--Lay Out and Cut a Common Rafter by the Rafter Table Method
5. Test
6. Answers to test

References:

1. Jones, Mack M. Shopwork on the Farm. New York: McGraw-Hill Book Company, 1955

2. Phipps, Lloyd, J., H.F. McColly, L.L. Scranton, and G.C. Cook. Farm Mechanics Text and Handbook. Danville, Illinois: Interstate Publishers and Printers.

3. Bear, W. Forest and Thomas A. Hoerner. Rafter Layout with the Framing Square for School and Home Workshop. St. Paul, Minnesota: Hobar Publications.

RAFTER FRAMING
UNIT [illegible]

INFORMATION SHEET

I. Terms and definitions (Transparency 1)

A. Span--The distance over the plates

B. Run--The shortest horizontal distance measured from a plumb line through the center of the ridge to the outer edge of the plate

C. Rise--The vertical distance from the top of the ridge to the level of the birds mouth, rise = pitch times 2 times the run

D. Pitch--The slope or slant of a roof expressed as rise in inches per foot of run

E. Plate--The roof member to which rafters are framed at the lower end

F. Ridge board--A horizontal roof member used for connecting the upper ends of the rafters

G. Rafter--A supporting roof member

H. Common rafter--The rafter extending at right angles from the plate to the ridge

I. Hip rafter--A rafter extending diagonally from the corner of the plate to the ridge

J. Valley rafter--A rafter extending diagonally from plate to ridge at the point of intersection of two roof surfaces

K. Jack rafter--A rafter that does not extend from plate to ridge

L. Hip jack--The rafters which extend from the ridge to the hip rafters

M. Valley jack--The rafters which extend from the ridge to the valley rafters

N. Ridge cut--The cut end which rests against the plate

O. Seat cut--The cut end which rests against the plate

P. Side cuts--The fittings for other roof members

(Example: Hip, valley, and jack rafters have side cuts where they fit against other roof members.)

Q. Measuring line--A line on which the rafter length is measured

R. Tail--The position of a rafter extending beyond the plate

INFORMATION SHEET

S. Foot line--The horizontal plane level with the top of the plate

T. Cripple jack--The rafters which extend from a hip rafter to a valley rafter

U. Birds mouth--Notch cut in rafter to fit plate

V. Tail cut--The cut at the end of the tail

II. Steel framing square (Transparency 2)

A. Made in form of right angle

B. Has two arms

1. Body--24 inches long, 2 inches wide

2. Tongue--16 inches long, 1 1/2 inches wide

C. Heel--Where the tongue and body meet

D. Face--The visible side when body is held in left hand and the tongue in right hand, with heel up

E. Back--Opposite side of face

III. Tables found on framing square (Transparency 3)

A. Essex

1. Located on back of the body

2. Used in figuring board feet

B. Octagon

1. Located on face of tongue

2. Used to lay off an eight-sided figure from a four-sided figure

C. Brace

1. Located on back of tongue

2. Used in figuring the length of common braces

D. Rafter

1. Located on face of body

2. Used in determining length and cuts of all rafters

INFORMATION SHEET

IV. Types of roofs (Transparency 4)

- A. Lean-to
- B. Gable
- C. Hip
- D. Gable and valley
- E. Hip and valley
- F. Flat
- G. Quonset
- H. Deck

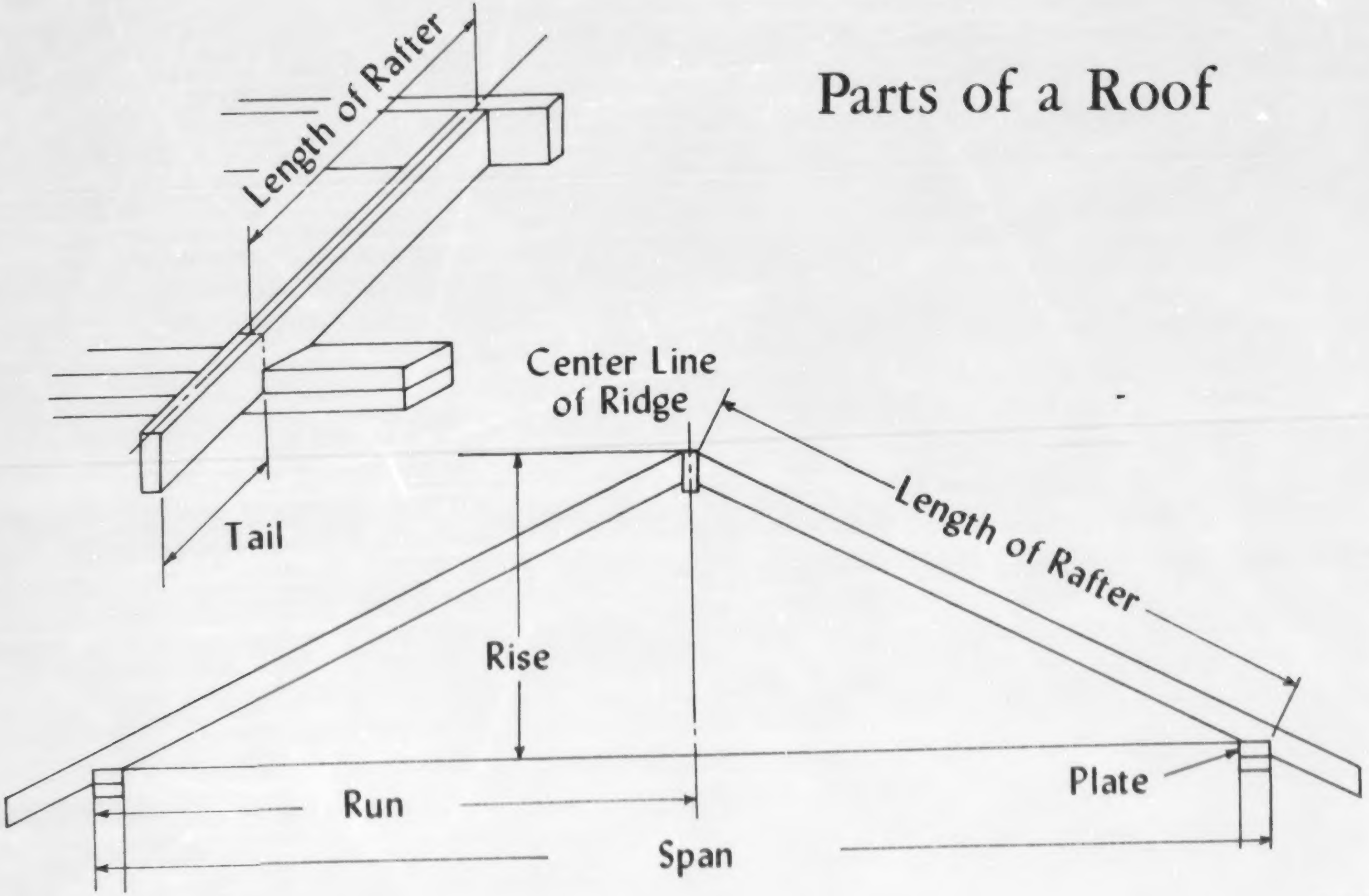
V. Kinds of rafters (Transparency 5)

- A. Common
- B. Jack
- C. Valley
- D. Hip

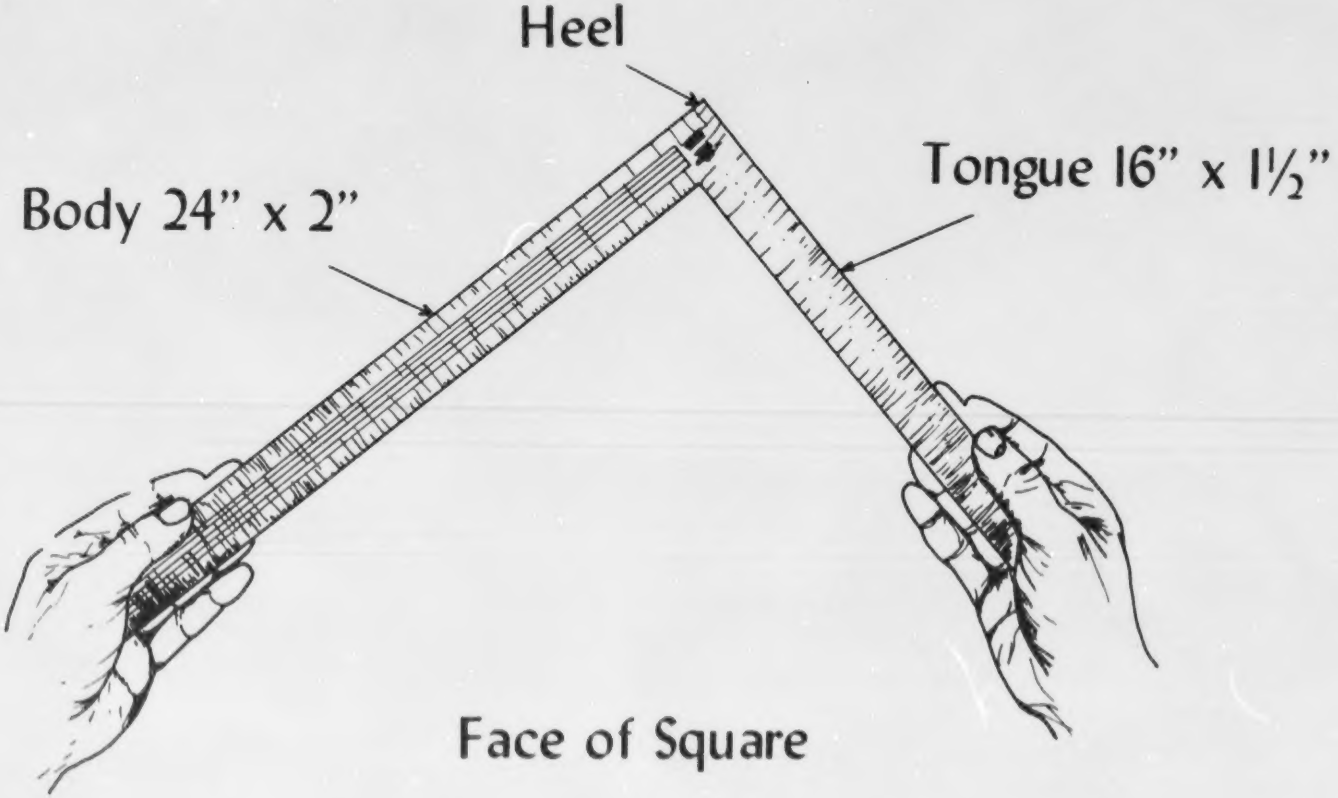
VI. Finding lengths of common rafters (Transparency 6)

- A. Mathematical method
- B. Scaling method
- C. Stepping method
- D. Rafter table method

Parts of a Roof

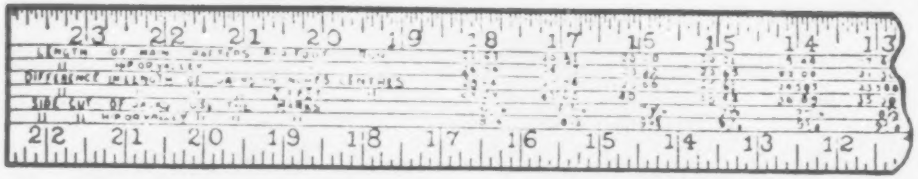

Length of Rafter
Tail
Center Line of Ridge
Length of Rafter
Rise
Run
Plate
Span

Parts of Steel Framing Square

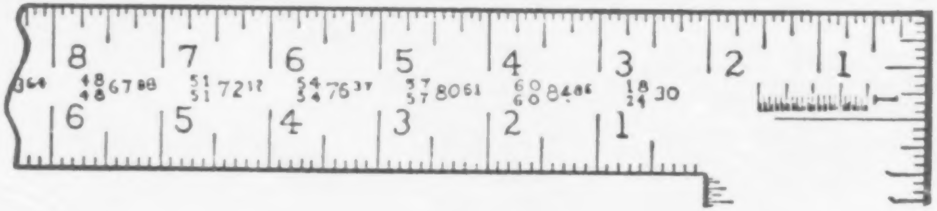

Heel
Tongue 16" x 1½"
Body 24" x 2"

Face of Square

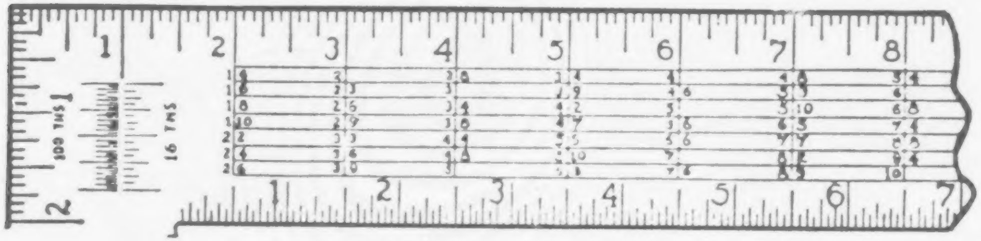
Framing Square Tables


23 22 21 20 19 18 17 16 15 14 13
22 21 20 19 18 17 16 15 14 13 12

Rafter or Framing Table

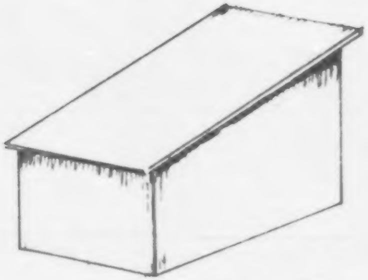

8 7 6 5 4 3 2 1
6 5 4 3 2 1

Essex Table

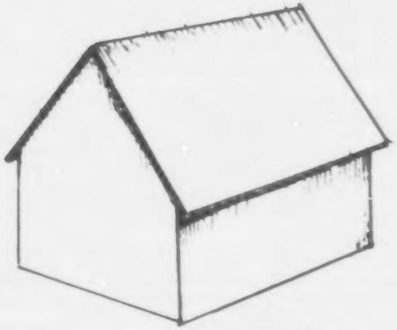

1 2 3 4 5 6 7 8
100 THS
16 THS
2
1 2 3 4 5 6 7

Brace Table

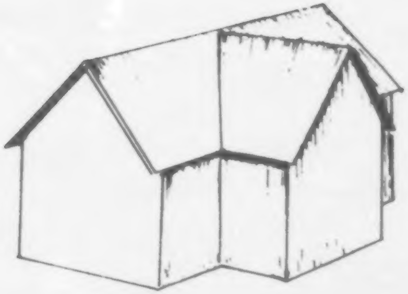
Types of Roofs



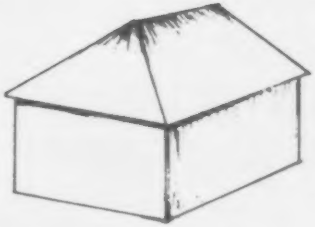
Lean-To



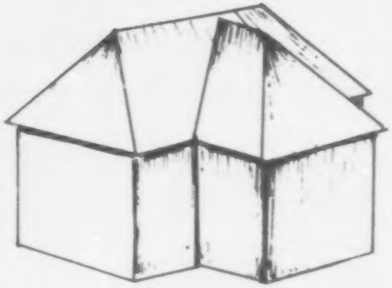
Gable



Gable and Valley



Hip

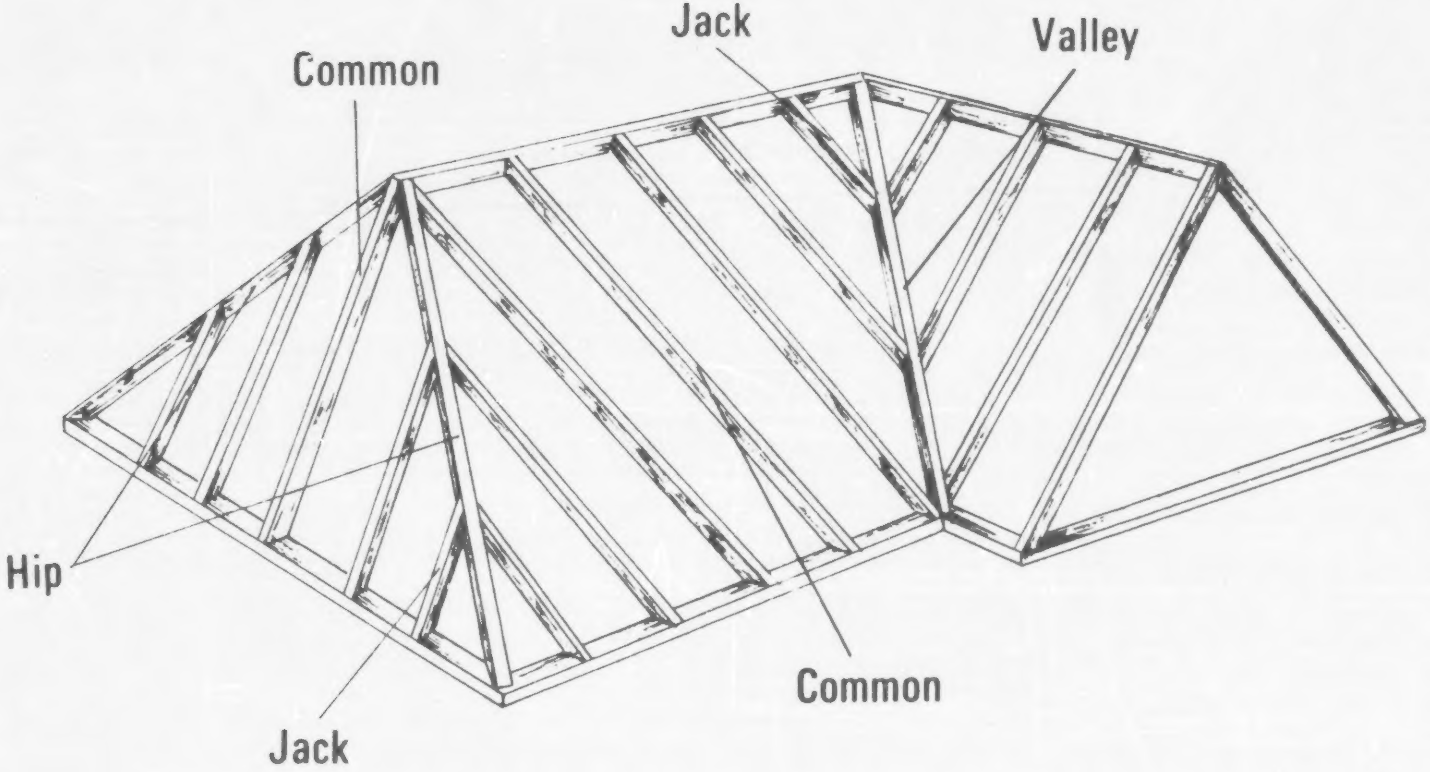


Hip and Valley

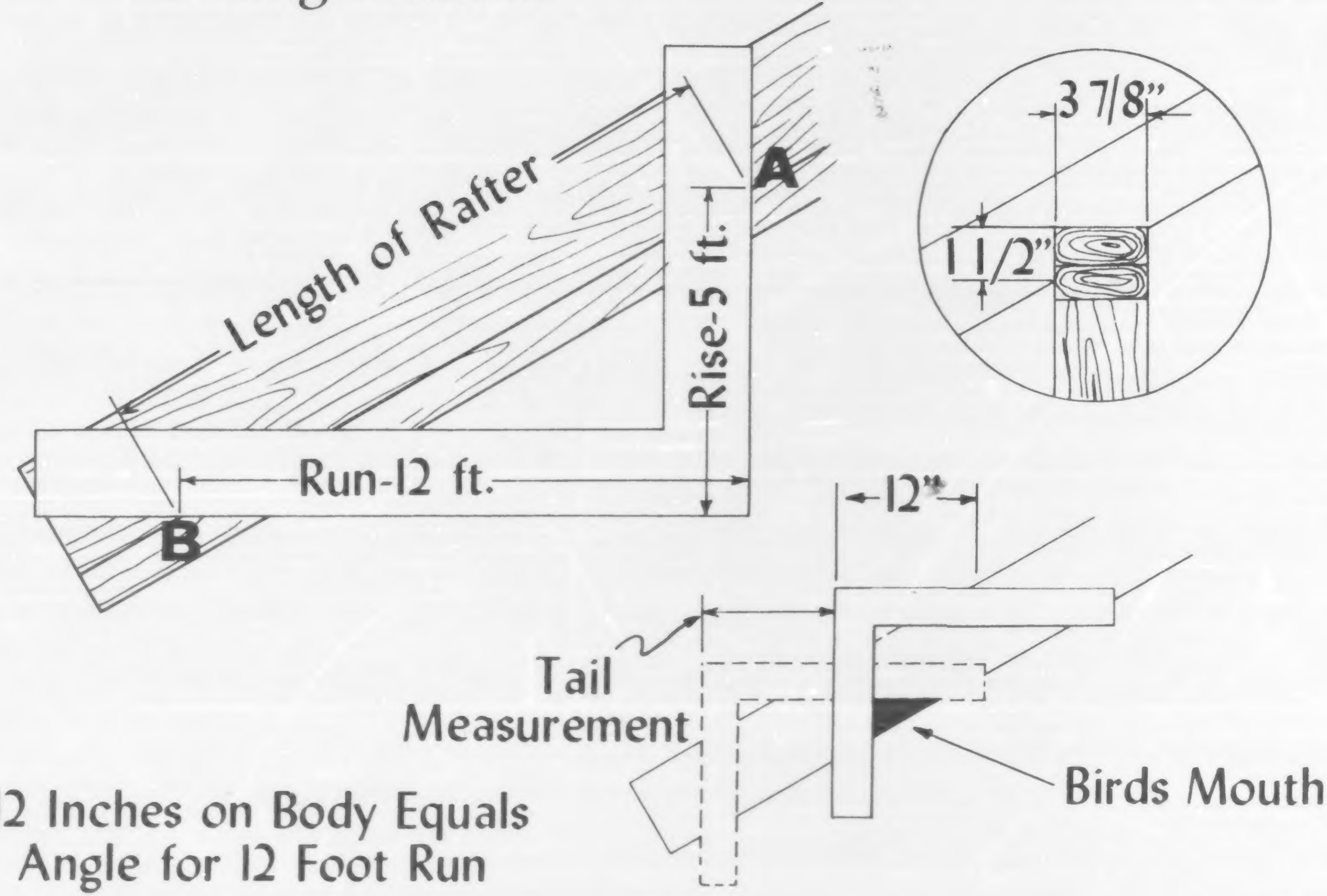
Ag. IV - 113-D

TM 4

Kinds of Rafters


Jack
Valley
Common
Hip
Common
Jack

Cutting a Rafter


Length of Rafter
A
Rise-5 ft.
Run-12 ft.
B
3 7/8"
1 1/2"
12"
Tail Measurement
Birds Mouth

12 Inches on Body Equals
Angle for 12 Foot Run

RAFTER FRAMING
UNIT II

JOB SHEET #1--LAY OUT A COMMON RAFTER BY STEPPING METHOD

I. Tools and materials needed

  A. Square

  B. Pencil

  C. 2 X 4 or 1 X 4 stock of wood or cardboard

II. Proceedures

  A. Figure the span--width of building, outside of plate to outside of plate. Example 12' wide.

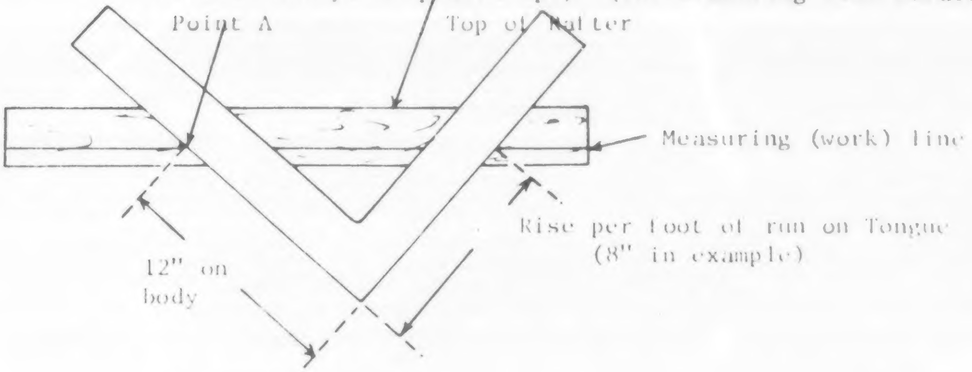
  B. Figure run--run is usually 1/2 of the span or the horizontal distance covered by one rafter. Example 1/2 X 12 = 6'

  C. Figure rise--the vertical distance from top of the ridge to the level of the foot. Example rise 4'

  D. Figure pitch of roof--pitch equals rise divided by span. Example P = R/S = 4/12 = 1/3 pitch.

  E. Figure rise per foot of run--rise per foot of run is equal to pitch times 24 on rise X 12 divided by length of run. Example 1/3 X 24 = 8" or 4 X 12/6 = 8"

  F. Draw measuring line on rafter--lay tongue of square on bottom of rafter and draw line along top of tongue. (NOTE: If rafter has a bow, the bow always is placed up.) (The measuring line locates the depth of the bird's mouth.)



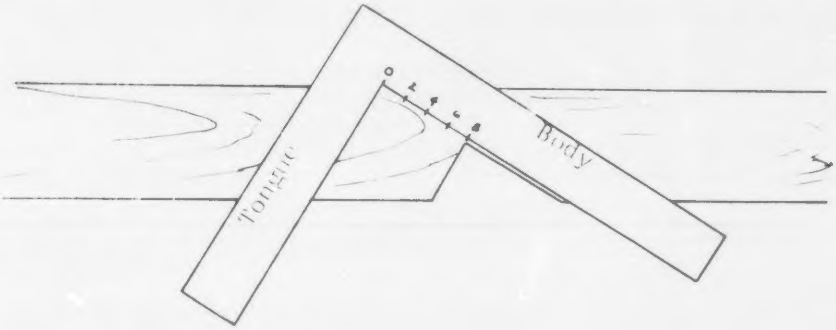
  G. Determine rafter figures to use--on a common rafter, use 12 on the outside of body and rise per foot of run (8" in example) on outside of tongue.

  H. Lay square on upper end of rafter as shown in Figure 1.

  I. Draw the ridge cut along tongue of square and make a mark on the measureing line by body. (Point A, Figure 1.)

JOB SHEET #1

O. Determine tail projection - place body of square in line with the seat cut as shown in figure.

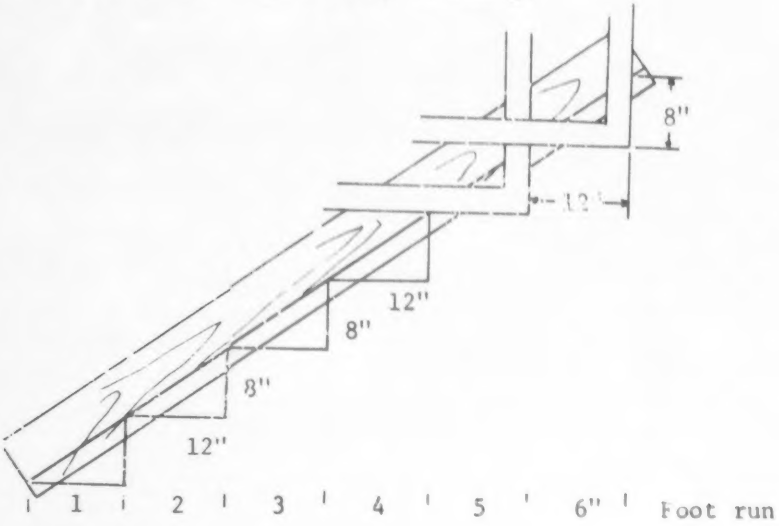


P. Measure horizontal tail projection in inches on body (if 8" projection place 8 on birdsmouth point).

Q. Draw a tail cut using tongue and turn in to instructor.

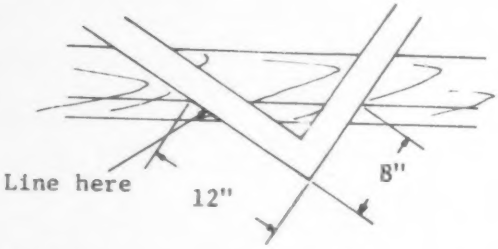
JOB SHEET #1

J. Step down work line maintaining 12" rise per foot of run (8") on square, as shown in Figure 2. Since each step of square measures one foot of run, you must make the same number of steps with the square as there are feet of run of the building.


8"
12"
12"
8"
8"
12"
1
2
3
4
5
6"
Foot run

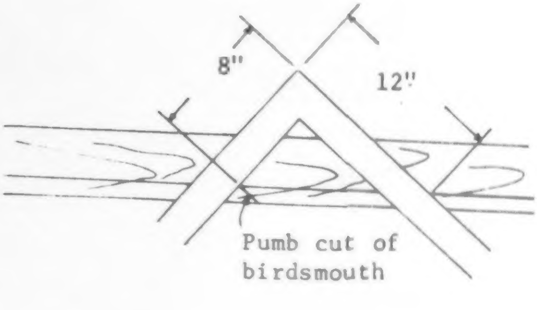
K. Last mark, locates rafter length and birds mouth.

L. Draw a line through mark to bottom of the rafter on the body.


Line here
12"
8"

M. Turn square over (heel up maintaining numbers 12 & 8)

N. Place square over point to make a line perpendicular to seat cut. (completes birdmouth)


8"
12"
Pumb cut of birdsmouth

RAFTER FRAMING
UNIT II

JOB SHEET #2--LAY OUT & CUT A COMMON RAFTER BY THE RAFTER TABLE METHOD

I. Tools & materials
   A. Square with a rafter table
   B. Pencil
   C. 2X4 or 1X4 stock of wood or cardboard

II. Proceedures

   A. Figure span--width of building, outside of plate to outside of plate. Example 12' wide.
   B. Figure run--run is usually 1/2 of span or the horizontal distance covered by one rafter. Example 1/2 of 12 = 6'
   C. Figure rise--vertical distance from top of ridge to level of foot. Example rises 4'
   D. Figure pitch of roof-pitch equals rise divided by span. Example pitch = 4/12 = 1/3
   E. Figure rise per foot of line--rise per foot of run is equal to pitch times 24 or rise times 12 divided by length of run Example 1/3 X 24 = 8" or 4X12/6 = 8"
   F. Place measuring line on rafter--lay tongue of square on bottom of rafter & draw line. (NOTE: If rafter has a bow, the bow is always placed up.)
   G. Locate rafter length per foot of run on rafter table for common rafters--First find on the "inch line" on the top edge of the body the figure that is equal to rise per foot of run.--Read first line under figure. (Need drawing similar to Figure 22 & Figure 23 on page 17 & 18 of Stanley Steel Square Booklet.) Example under 8", first line, find 14.42"
   H. Determine rafter length--rule: Multiply the "Length given in table" by the number of feet run. Example 14.42 X 6 = 86.52"
   I. Determine rafter figures to use--use 12 on outside of body and rise per foot of run on tongue--(12&8). All cuts are made with these two figures.
   J. Place ridge cut on upper end of rafter. (Drawing Figure 1 of Worksheet 1)
   K. Mark rafter length on work line.
   L. Mark seat cut--using 12 on body & rise per foot of run on tongue. (NOTE: Seat cut is always perpendicular to ridge cut)

JOB SHEET #2

M. Place plumb cut of birdsmouth on rafter: (NOTE: Must be parallel to ridge cut.)

N. Determine tail projection - place body of square in line with the seat cut. Example 5" horizontal overhang.

O. Measure horizontal rafter projection in inches on the body.

JOB SHEET #2

P. Draw on tail cut using tongue. (NOTE: If a ridge board is used, 1/2 the ridge thickness must be taken off of top of rafter.)

Q. Cut out rafter and turn in to instructor

RAFTER FRAMING
UNIT II

TEST

1. Define the following terms.

   a. Pitch--

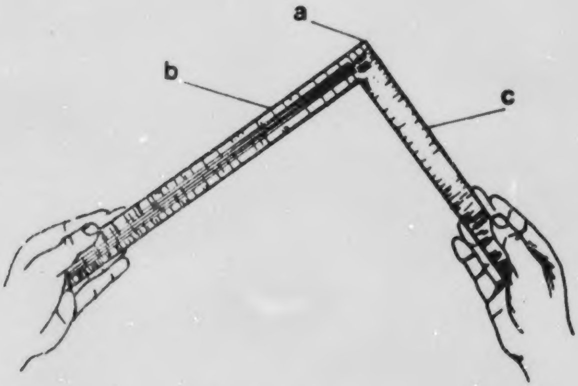
   b. Run--

   c. Rafter--

   d. Common rafter--

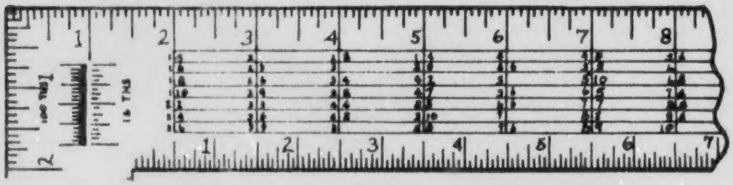
   e. Seat cut--

2. Identify the parts of the steel framing square



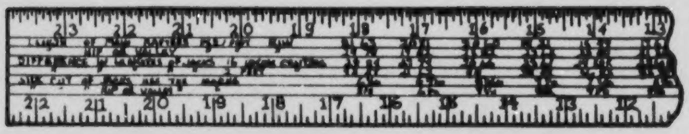
a.__________________ b.__________________ c.__________________

3. Identify the following tables found on the steel framing square and name one use of each.



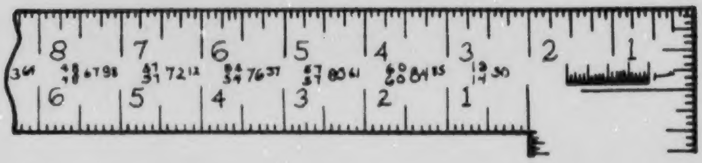
a. __________________

b. __________________


23
22
21
20
19
18
17
16
15
14
13
22
21
20
19
18
17
16
15
14
13
12

c. ________________

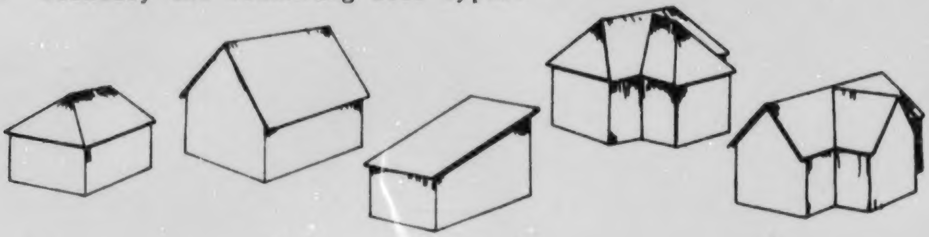
d. ________________


8
7
6
5
4
3
2
1
6
5
4
3
2
1

e. ________________

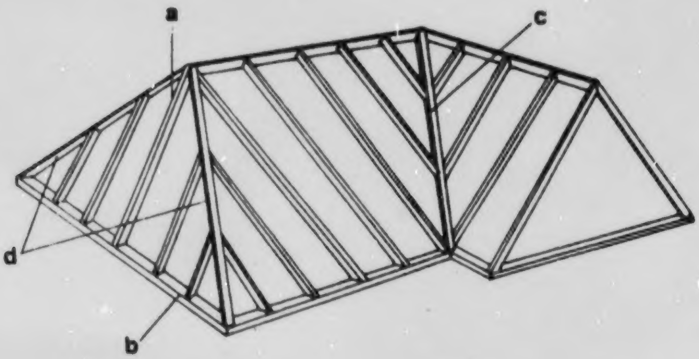
f. ________________

4. Identify the following roof types.



a.________________ b.________________ c.________________ d.________________
e.________________

5. From the drawing below label the various kinds of rafters



a._____

b._____

c._____

d._____

6. Name three methods of determining the length of common rafters.

   a.

   b.

   c.

7. Demonstrate the procedures for laying out and cutting common rafters.

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity is to be completed.)

RAFTER FRAMING
UNIT II

ANSWERS TO TEST

1. a. Pitch--The slope or slant of a roof expressed as rise in inches per foot of run

   b. Run--The shortest horizontal distance measured from a plumb line through the center of the ridge to the outer edge of the plate

   c. Rafter--A supporting roof member

   d. Common rafter--A rafter extending at right angles from the plate to the ridge

   e. Seat cut--The cut end which rests against the plate

2. a. Heel

   b. Body

   c. Tongue

3. a. Brace table

   b. Used in figuring length of common braces

   c. Rafter or framing table

   d. Used in determining length of rafters

   e. Essex table

   f. Used in figuring board feet

4. a. Hip roof

   b. Gable roof

   c. Lean-to roof

   d. Hip and valley roof

   e. Gable and valley roof

5. a. Common rafter

   b. Jack rafter

   c. Valley rafter

   d. Hip rafter

6. Any three of the following

   a. Mathematical method

   b. Scaling method

   c. Stepping method

   d. Rafter table method

7. Performance skills will be evaluated to the satisfaction of the instructor.

FARM UTILITY BUILDINGS
UNIT III

TERMINAL OBJECTIVES

After completion of Unit III, the student should be able to match terms associated with farm buildings, list the common types of foundations, and identify types of roof framing. He should be able to identify the kinds of roofing materials and the methods of attaching siding. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with farm buildings with the proper definition.
2. List factors to consider when planning a farm building.
3. Name building materials often used in farm utility buildings.
4. Identify the types of farm utility buildings.
5. Select from a list the causes of building failures.
6. List the common types of foundations and wall supports.
7. Identify the various types of roof framing.
8. List factors to consider when selecting roofing materials.
9. Identify the kinds of roofing materials that are commonly used on farm buildings.
10. Identify four methods of attaching siding.
11. Match the advantages and disadvantages of the various floors to the specific types of floors found in farm buildings.
12. List the characteristics to consider when selecting exterior paints.
13. Determine the cost of a farm building.

FARM UTILITY BUILDINGS
UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information and assignment sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Complete assignment sheet
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    TM 1--Framing Terms
    TM 2--Building Failures
4. Assignment Sheet
    #1--Determine the Cost of a Farm Building
5. Test
6. Answers to test

References:

1. American Association for Agriculture Engineering and Vocational Agriculture, Agriculture Engineering Center. Farm Utility Buildings. Athens, Georgia: Stein Printing Company, 1969.

FARM UTILITY BUILDINGS
UNIT III

INFORMATION SHEET

I. Terms and definitions (Transparency 1)

A. Sill--Horizontal timbers which form the lowest members of a frame supporting the superstructure of a building

B. Stud--An upright member, usually a piece of dimension lumber, used in the framework of a wall

C. Plate--Term usually applied to a 2 x 4 placed on top of studs in frame walls

D. Purlin--A beam spanning the principle roof supports

E. Ridge--The highest point of a roof composed of sloping sides

F. Truss-A combination of members such as beams, bars, and ties usually arranged in triangular units to form a rigid framework for supporting loads over a long span

G. Rafters--Sloping members of a roof such as the ribs which extend from the ridge or from the hip of a roof to the eaves

H. Girder--A large supporting built-up horizontal member used to support walls or joints

I. Gussett--A brace or angle bracket used to stiffen a corner or angular piece of work

J. Knee brace--A framing member placed across the inside of an angle in a framework to add stiffness to the frame

II. Factors to consider when planning a farm building

A. Decide the size of building needed

B. Decide where to locate the building

C. Decide the type of building needed

(NOTE: Keep in mind the appearance of the building in relationship to other buildings on the farm.)

D. Decide the kind of materals to use

E. Consult persons experienced in building and in the use of agricultural buildings

INFORMATION SHEET

F. Figure bills of materials and the total cost of the building

(NOTE: If hiring a contractor, bids from several contractors should be secured.)

III. Building materials used in agriculture buildings

A. Sawed lumber

B. Logs and poles

C. Concrete

D. Brick

E. Tile

F. Concrete blocks

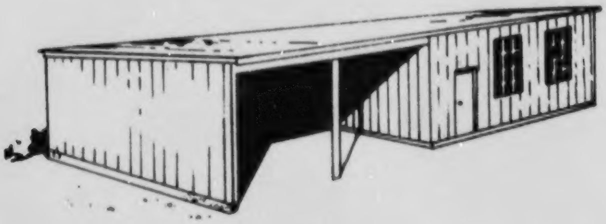
G. Stone

H. Metal

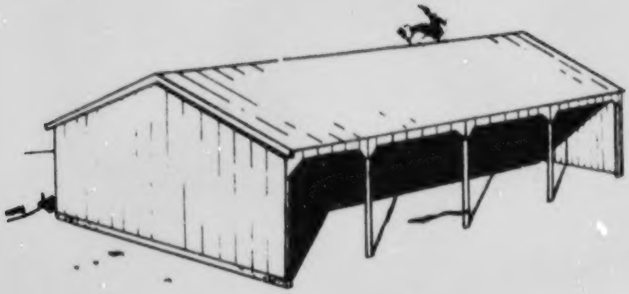
I. Composition board and exterior plywood

IV. Types of farm buildings

A. Shed type

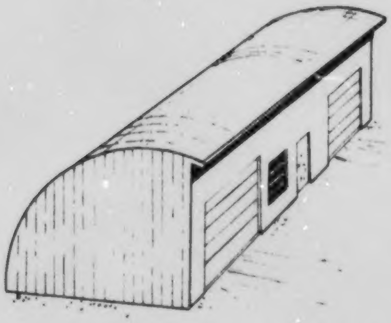


B. Gable type

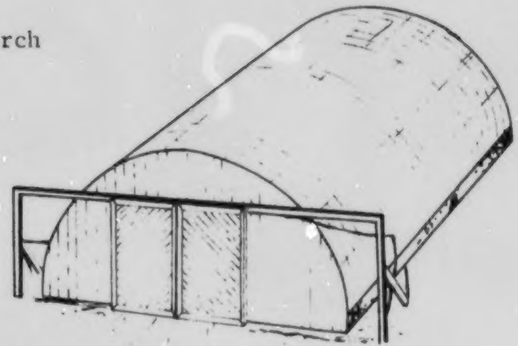


INFORMATION SHEET

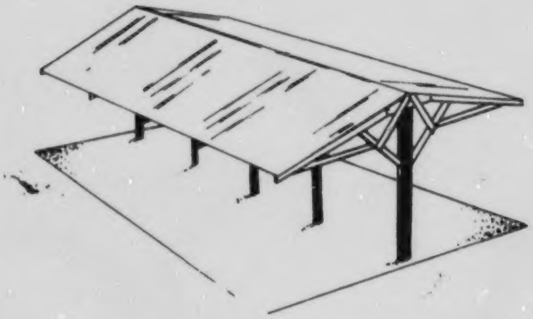
C. Half arch



D. Full arch



E. Umbrella type



V. Causes of building failures (Transparency 2)

A. Builder did not use the grade and type of material called for in the specifications

B. Builder did not make joints as strong as the structural member

(NOTE: The critical joints are where the sills rest on the foundation, where roof rafters or trusses rest on plates, side walls, or columns, and where the roof-ridge members are joined.)

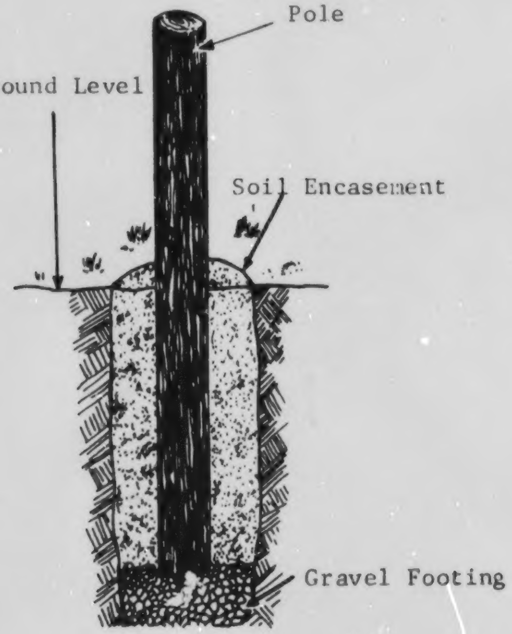
C. Inadequate foundation

INFORMATION SHEET

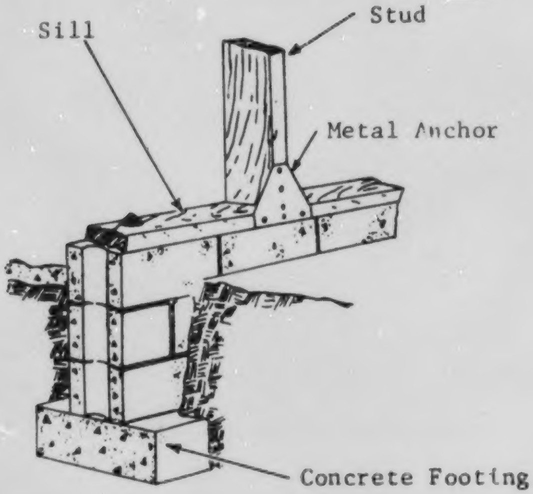
D. Poor design

VI. Common types of foundations and wall supports

A. Wood or steel poles or posts and piers

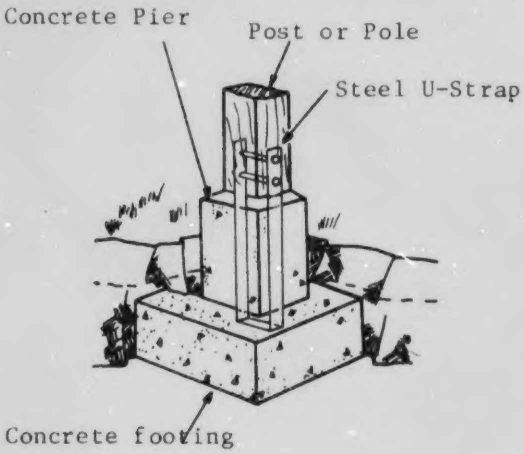

Pole
Ground Level
Soil Encasement
Gravel Footing

B. Light wood frame with masonry or concrete foundation


Sill
Stud
Metal Anchor
Concrete Footing

INFORMATION SHEET

C. Post and girt with masonry or concrete foundation


Concrete Pier
Post or Pole
Steel U-Strap
Concrete footing

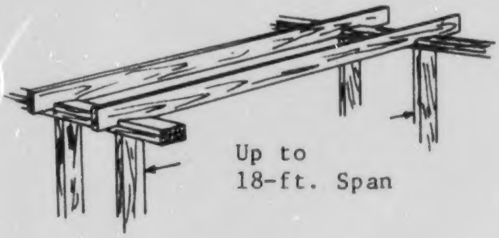
D. Masonry walls on concrete foundations

E. Steel structures

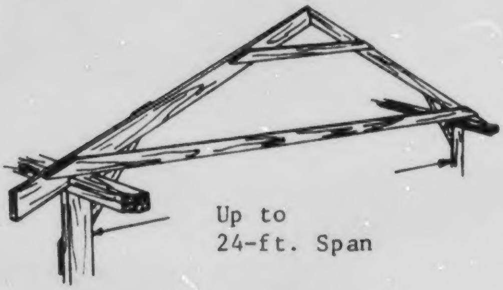
F. Combinations of above

VII. Types of roof framing

A. Common rafter

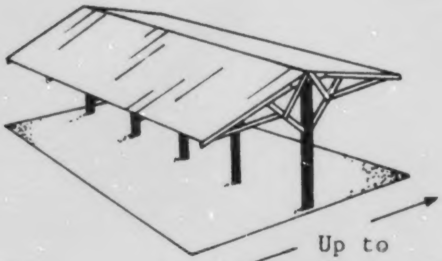

Up to
18-ft. Span

B. Truss


Up to
24-ft. Span

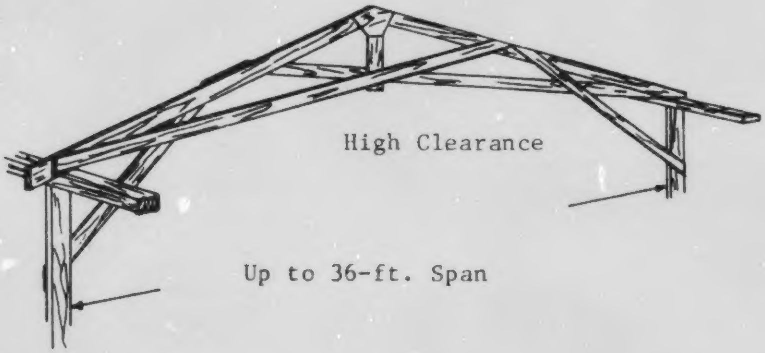
INFORMATION SHEET

C. Umbrella truss



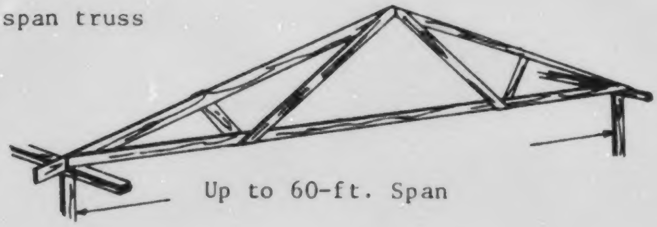
Up to
28-ft. Span

D. High clearance truss



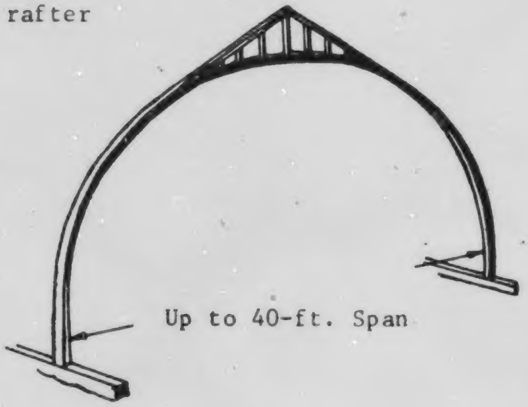
Up to 36-ft. Span

E. Wide span truss



Up to 60-ft. Span

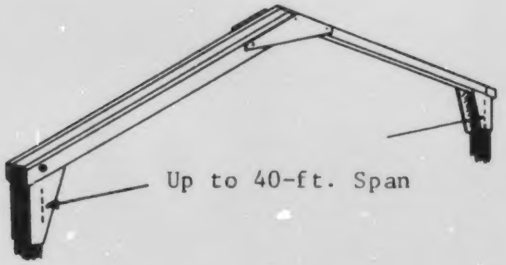
F. Curved-arch rafter



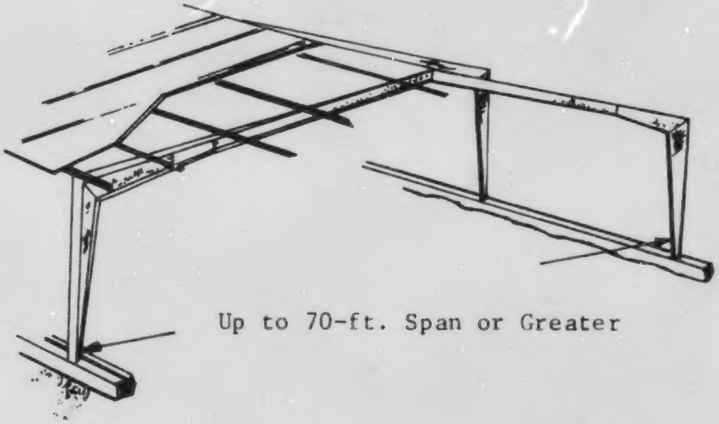
Up to 40-ft. Span

INFORMATION SHEET

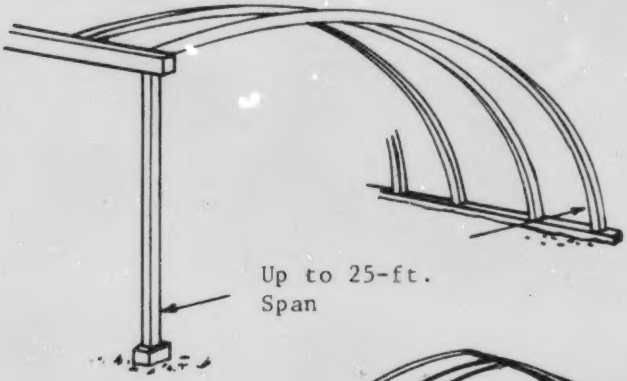
G. Rigid-wood frame


Up to 40-ft. Span

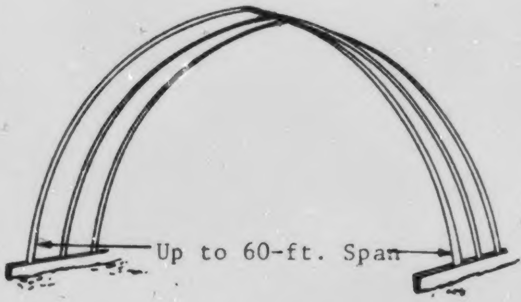
H. Rigid-steel frame


Up to 70-ft. Span or Greater

I. Steel frame

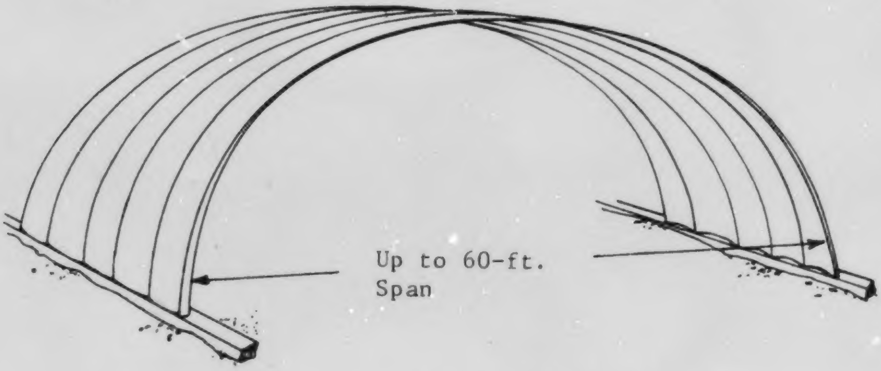

Up to 25-ft.
Span

J. Laminated rafters or steel frame


Up to 60-ft. Span

INFORMATION SHEET

K. Frameless steel (Formed roof sheets)



VIII. Factors to consider when selecting roofing materials

A. Probable life expectancy due to weathering

B. Fire resistance

C. Hail resistance

D. Resistance to heat from sun

E. Resistance to strong winds

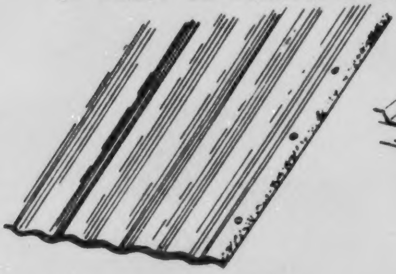
F. Maintenance

G. Kind of nailing or fastening required

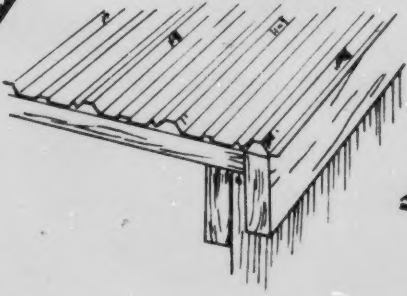
H. Cost

I. Appearance

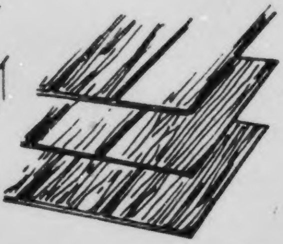
J. Ease of construction



Asbestos-Cement Sheets



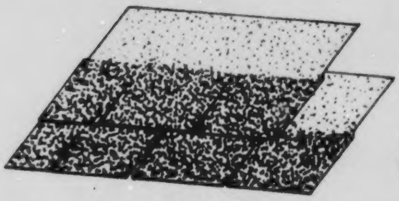
Galvanized Steel or Aluminum



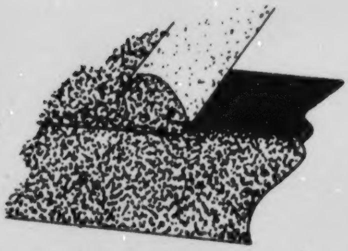
Wood Shingles

IX. Kinds of roofing materials

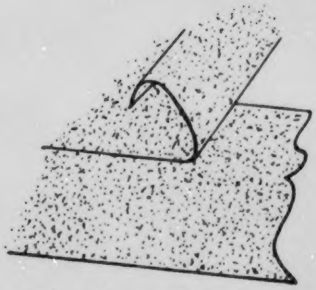
INFORMATION SHEET



Asphalt Shingles

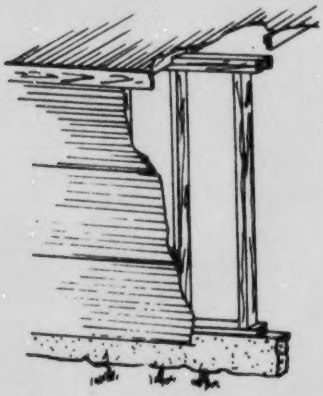


Selvage-Edge (Mineral Surface) Roll Roofing

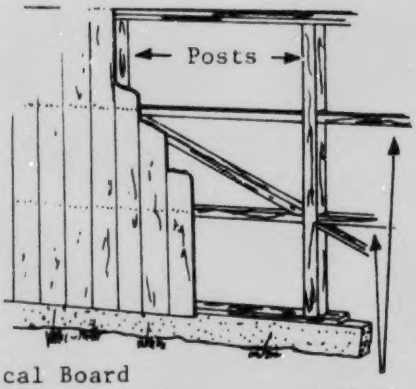


Smooth-Surfaced Roll Roofing

X. Methods of attaching siding



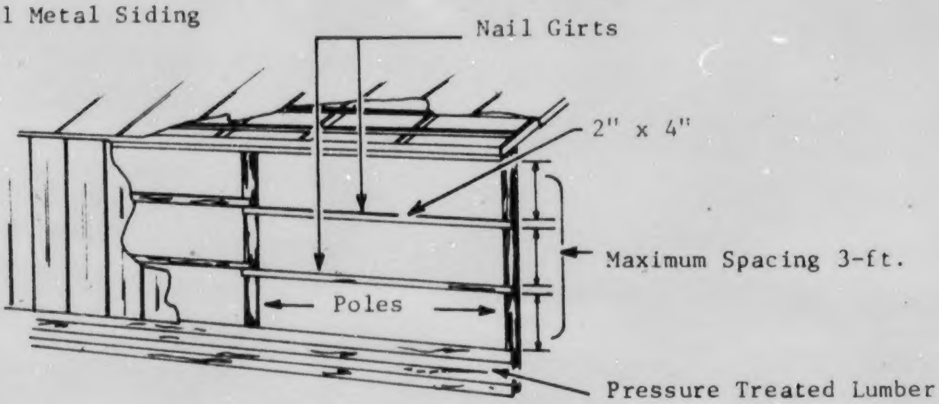
Metal Siding



Vertical Board Siding

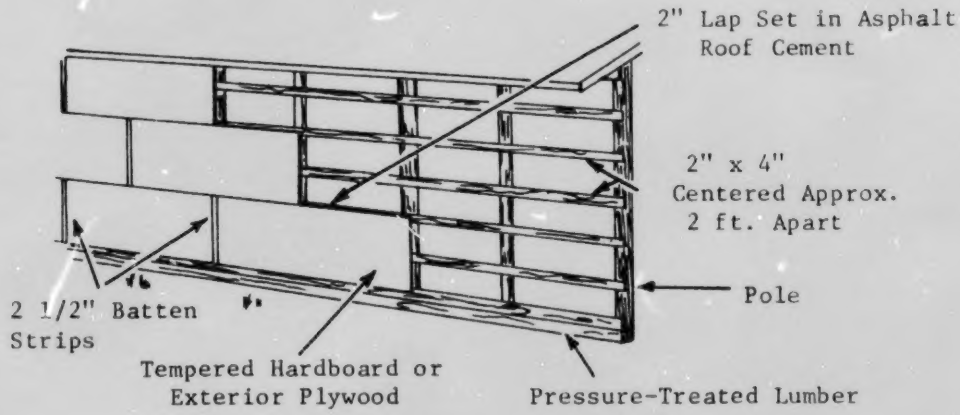
Posts
Nail Girts

Vertical Metal Siding



Nail Girts
2" x 4"
Maximum Spacing 3-ft.
Poles
Pressure Treated Lumber

INFORMATION SHEET


2" Lap Set in Asphalt Roof Cement
2" x 4" Centered Approx. 2 ft. Apart
Pole
2 1/2" Batten Strips
Tempered Hardboard or Exterior Plywood
Pressure-Treated Lumber

Tempered Hardboard or Exterior Plywood

XI. Advantages and disadvantages of various kinds of floors

A. Dirt

1. Advantages

a. Least costly

b. Absorbs oil and water

2. Disadvantages

a. Tools and equipment sink into the dirt

b. If floor is damp it provides enough moisture to rust tools and equipment

c. If the floor is dry, dust will usually be a problem with each gust of wind

d. Very difficult to clean

B. Crushed rock

1. Advantages

a. Dust is much less of a problem

b. Absorbs oil and water

INFORMATION SHEET

2. Disadvantages

    a. Not satisfactory in livestock structure because of cleaning problems

    b. It holds dirt and grease

    c. Tools and equipment will sink into the surface

C. Concrete

1. Advantages

    a. If properly placed, forms a hard dry surface

    b. Easy to keep clean

    c. Forms an excellent base for equipment and power tools

    d. Excellent for livestock structures

    e. It is fireproof and usually costs less than a wooden floor

2. Disadvantages

    a. Colder than a wooden floor

    b. More tiring to stand on when working continuously

    c. More expensive than most types of floors

D. Wood

1. Advantages

    a. Warmer during cold weather

    b. Less tiring to stand on for long periods of time

2. Disadvantages

    a. More expensive than most floors

    b. May not be strong enough to support heavy equipment

    c. Fire hazard especially in a shop

    d. Short life compared to concrete

INFORMATION SHEET

XII. Characteristics to consider when selecting exterior paints

A. Durability

1. Good white paint will give 4-5 years service

2. Good tinted paint will give 5-6 years service

3. Good dark color paint will give 6-8 years service

B. Self-cleaning--Wears off gradually and keeps the surface relatively clean

C. Highly reflective--Lighter colors will give a cooler building inside

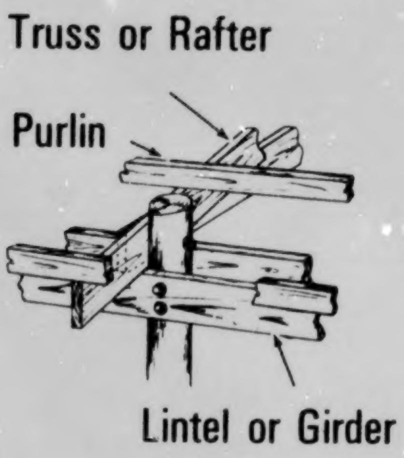
D. Dirt resistant

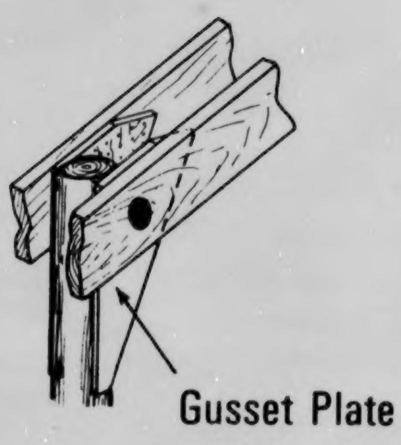
E. Withstands moisture--Resistant to blistering and peeling

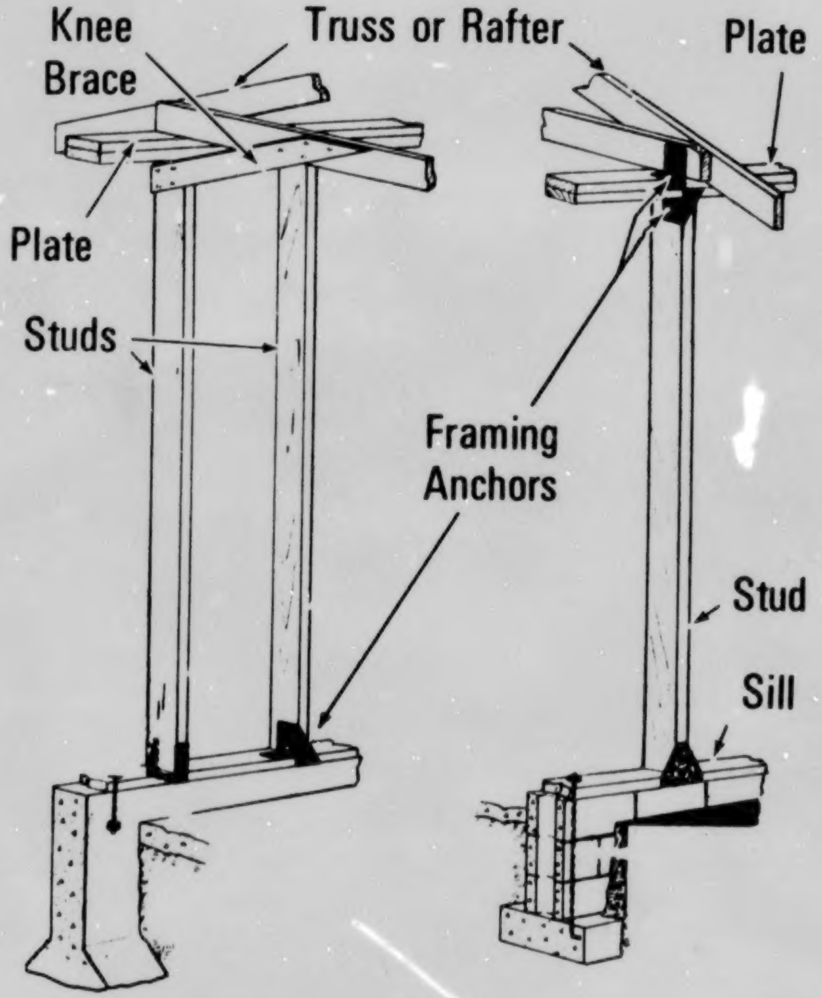
F. Resistant to stain and discoloration

G. Good hiding or covering qualities

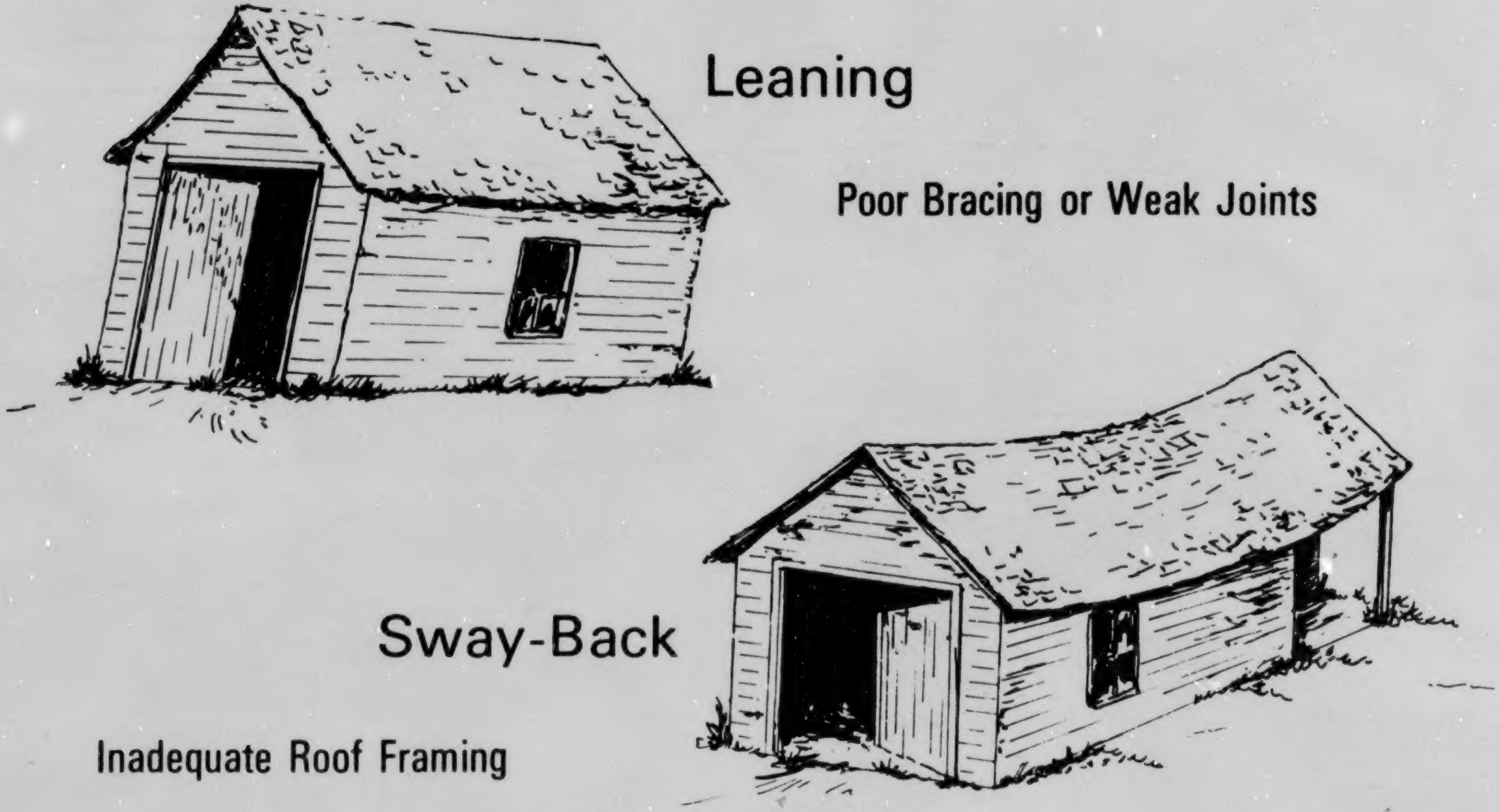
Framing Terms


Truss or Rafter
Purlin
Lintel or Girder


Gusset Plate


Knee Brace
Truss or Rafter
Plate
Plate
Studs
Framing Anchors
Stud
Sill

Building Failures



Leaning

Poor Bracing or Weak Joints

Sway-Back

Inadequate Roof Framing

TM 2

Ag. IV - 153-D

596

597

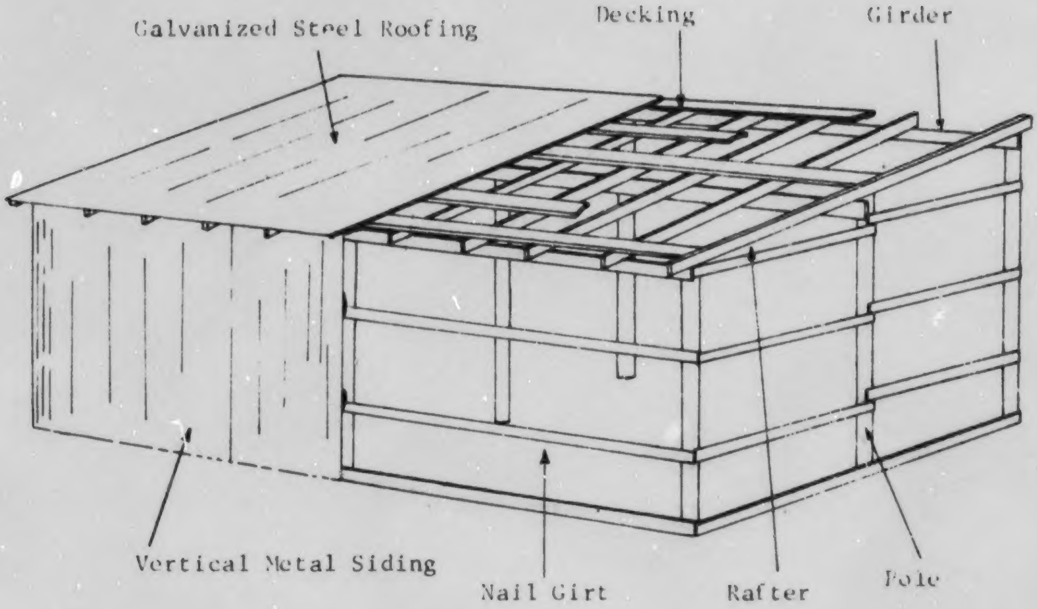
FARM UTILITY BUILDINGS
UNIT III

ASSIGNMENT SHEET #1--DETERMINE THE COST OF A FARM BUILDING

Consult your local dealer and determine the cost of constructing the following farm building:

1. Type structure--Pole type shed building
2. Specifications
    a. 12' wide x 20' long
    b. Back and sides enclosed
    c. 8' height in front and 6' height in back
    d. Treated 6" poles--Set 4' in ground
        1) 10' spacing lengthwise
        2) 6' spacing between poles on each end and center
    e. 2" x 6" girder in front, middle, and back
    f. 24" rafter spacing--(2" x 6" lumber)
    g. 12" overhang in front and back
    h. 2" x 4" decking--(2 ft. spacing)
    i. Galvanized steel roofing--(29 gage)
    j. Vertical metal siding--(29 gage)
    k. 2" x 4" nail girts on back and sides--(2 foot spacing between girts)

ASSIGNMENT SHEET #1


Galvanized Steel Roofing
Decking
Girder
Vertical Metal Siding
Nail Girt
Rafter
Pole

3. Cost

   a. Poles--(6" diameter)

      1) Number_____ Length_____ Cost each_____

      2) _____ _____ _____

      3) _____ _____ _____

      4) Total cost of poles____________________

      (NOTE: Poles should be four feet in ground.)

   b. Girders--(2" x 6")

      1) Number_____ Length_____ Cost/bd. ft._____

      2) Total cost of girders_________________

ASSIGNMENT SHEET #1

c. Rafters--(2" x 6")

1) Number______ Length______ Cost/bd. ft.______

2) Total cost of rafters___________________

d. Decking--(2" x 4")

1) Number______ Length______ Cost/bd. ft.______

2) Total cost of decking___________________

e. Horizonal nail girts--(2" x 4")

1) Back

a) Number______ Length______ Cost/bd.______

b) Cost of back girts______________________

2) Sides

a) Nkmber______ Length______ Cost/bd. ft.______

b) Cost of side girts__________________

3) Total cost of nail girts__________________

f. Metal roof--(29 gage)

1) Number of sheets (14')______

2) Cost/square______ Cost/sheet______

3) Total cost of metal roof______

g. Metal siding--(29 gage)

1) Back

a) Number of sheets______

b) Length______

c) Cost/sheet______

2) Sides

a) Length______ Number of sheets______ Cost/sheet______

b) Length______ Number of sheets______ Cost/sheet______

c) Length______ Number of sheets______ Cost/sheet______

ASSIGNMENT SHEET #1

3) Total cost of metal siding____________________

h. Miscellaneous expense--(nails and bolts) $10.00

i. Total cost of 12' x 20' pole shed__________________

FARM UTILITY BUILDINGS
UNIT III

TEST

1. Match the terms on the right with the proper definition.

_____a. A framing member placed across the inside of an angle in a framework to add stiffness to the frame

_____b. Horizontal timbers which form the lowest members of a frame supporting the superstructure of a building

_____c. A brace or angle bracket used to stiffen a corner or angular piece of work

_____d. An upright member, usually a piece of dimension lumber, used in the framework of a wall

_____e. Term usually applied to a 2 x 4 placed on top of studs in frame walls

_____f. A large supporting built-up horizontal member used to support walls or joists

_____g. A beam spanning the principle roof supports

_____h. The highest point of a roof composed of sloping sides

_____i. Sloping members of a roof such as the ribs which extend from the ridge or from the hip of a roof to the eaves

_____j. A combination of members such as beams, bars and ties, usually arranged in triangular units to form a rigid framework for supporting loads over a long span

1. Sill
2. Stud
3. Plate
4. Purlin
5. Ridge
6. Truss
7. Rafters
8. Girder
9. Gusset
10. Knee brace

2. List three factors to consider when planning a farm building

   a.

   b.

   c.

3. Name five building materials used in agriculture building

   a.

   b.

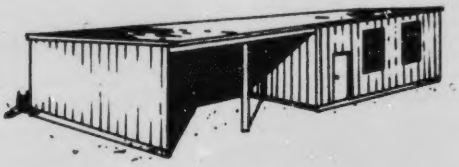
   c.

   d.

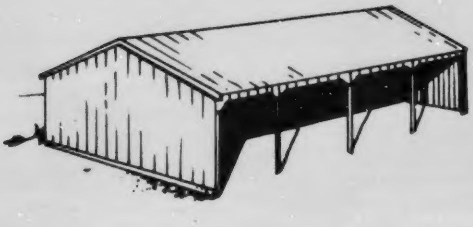
   e.

4. Identify the following types of farm utility buildings.

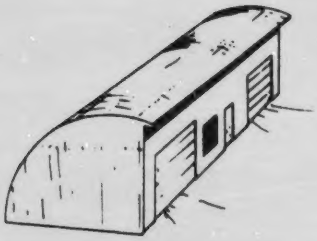
   a.



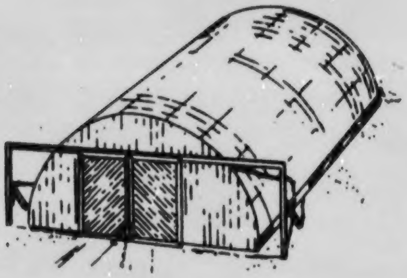
   b.



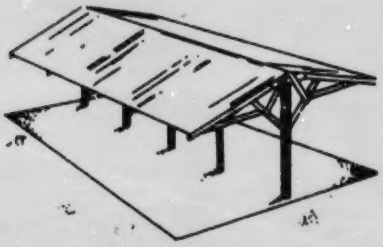
   c.



d.



e.



5. Select from the list below the causes of building failures. Place an "X" by the correct statement.

_____a. Builder did not use the grade and type of material called for in the specifications

_____b. Builder makes joints stronger than structural member

_____c. Inadequate foundation

6. List three common types of foundations and wall supports

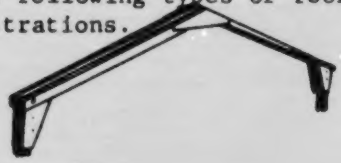
a.

b.

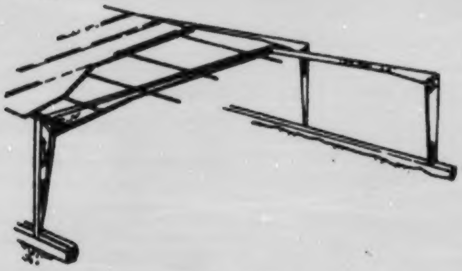
c.

7. Identify the following types of roof framing by matching the proper titles to the illustrations.

_____a.

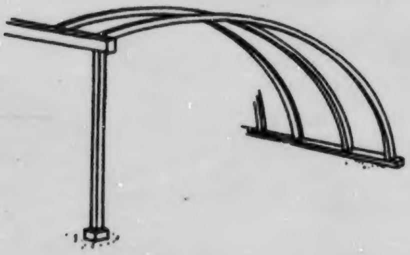


_____b.



1. Common rafter
2. Truss
3. Umbrella truss
4. High clearance truss
5. Curved-arch rafter
6. Rigid-wood frame
7. Rigid-steel frame

_____c.



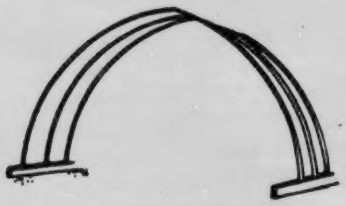
8. Wide span truss

9. Steel frame

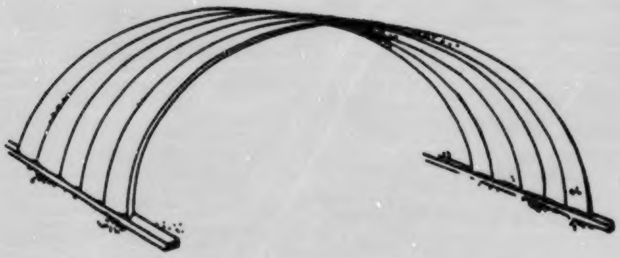
10. Laminated rafters or steel frame

11. Frameless steel

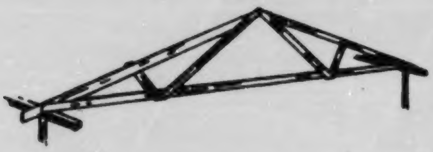
_____d.



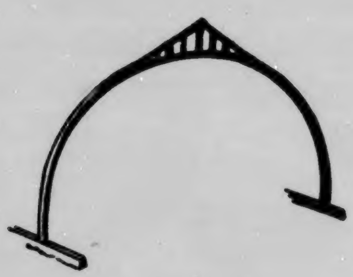
_____e.



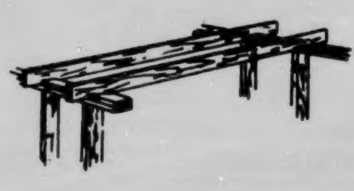
_____f.



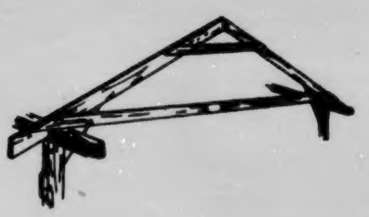
_____g.



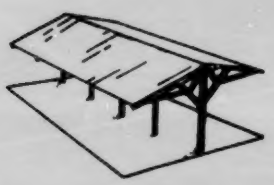
_____h.



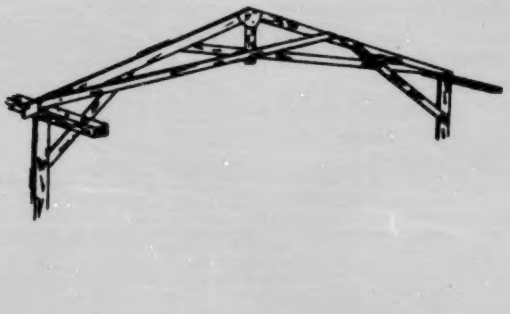
_____i.



_____j.



_____k.



8. Name five factors to consider when selecting roofing materials.

   a.

   b.

   c.

   d.

   e.

9. Identify the following roofing materials by matching the drawings to the correct materials.

   _____a. Selvage-edge (mineral surface) roll roofing

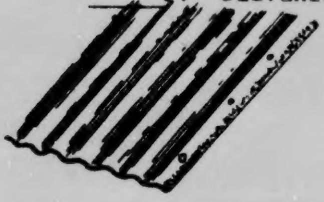
   _____b. Asphalt shingles

   _____c. Smooth-surfaced roll roofing

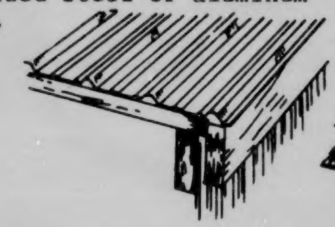
   _____d. Asbestos-cement sheets

   _____e. Wood shingles

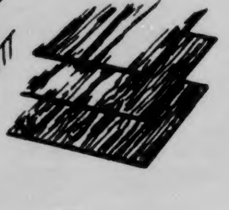
   _____f. Galvanized steel or aluminum



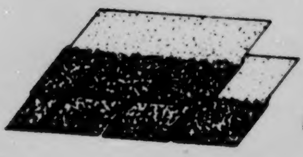
1.



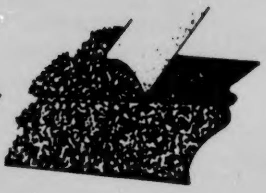
2.



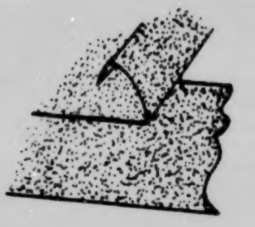
3.



4.



5.



6.

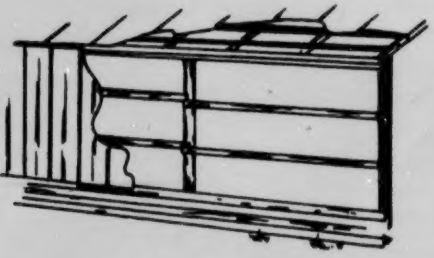
10. Identify the methods of attaching siding by matching the illustration to the proper terms.

_____a. Metal siding

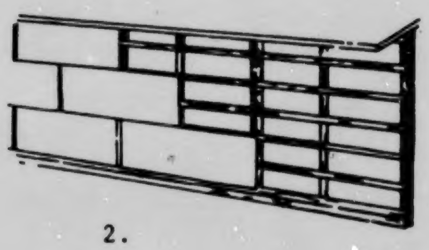
_____b. Vertical metal siding

_____c. Tempered hardboard or exterior plywood

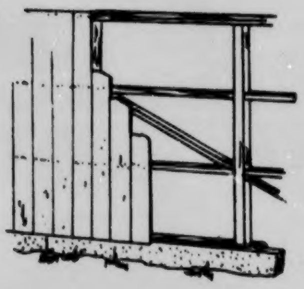
_____d. Vertical board siding



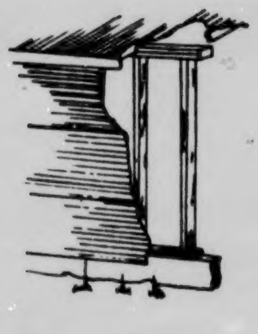
1.



2.



3.



4.

11. Match the advantages and/or disadvantages of the various floors with the specific types of floors found in farm buildings.

    (NOTE: Advantages and disadvantages may be used on more than one type floor.)

    a. Dirt floor

    _____1)

    _____2)

    _____3)

    _____4)

    b. Crushed rock

    _____1)

    _____2)

    _____3)

    c. Concrete

    _____1)

    _____2)

    _____3)

    _____4)

    _____5)

    _____6)

    _____7)

    d. Wooden floor

    _____1)

    _____2)

12. List three characteristics to consider when selecting exterior paints.

    a.

    b.

    c.

13. Determine the cost of a farm building

    (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity should be completed.)

FARM UTILITY BUILDINGS
UNIT III

ANSWERS TO TEST

1. a. 10
   b. 1
   c. 9
   d. 2
   e. 3
   f. 8
   g. 4
   h. 5
   i. 7
   j. 6

2. Any three of the following:
   a. Decide the size of building needed
   b. Decide where to locate the building
   c. Decide the type of building needed
   d. Decide the kind of materials to use
   e. Consult persons experienced in building and in the use of agricultural buildings
   f. Figure bills of materials and the total cost of the building

3. Any five of the following:
   a. Sawed lumber
   b. Logs and poles
   c. Concrete
   d. Brick
   e. Tile
   f. Concrete blocks

g. Stone

h. Metal

i. Composition board and exterior plywood

4. a. Shed type

b. Gable type

c. Half arc

d. Full arc

e. Umbrella type

5. a and c

6. Any three of the following:

a. Wood or steel poles or posts and piers

b. Light wood frame with masonry or concrete foundation

c. Post and girt with masonry or concrete foundation

d. Masonry walls on concrete foundation

e. Steel structures

f. Combinations of above

7. a. 6

b. 7

c. 9

d. 10

e. 11

f. 8

g. 5

h. 1

i. 2

j. 3

k. 4

8. Any five of the following:
   - a. Probable life expectancy due to weathering
   - b. Fire resistance
   - c. Hail resistance
   - d. Resistance to heat from sun
   - e. Resistance to strong winds
   - f. Maintenance
   - g. Weight
   - h. Kinds of nailing or fasteners required
   - i. Cost
   - j. Appearance
   - k. Ease of construction

9. a. 5
   - b. 4
   - c. 6
   - d. 1
   - e. 3
   - f. 2

10. a. 4
    - b. 1
    - c. 2
    - d. 3

11. a. a,b,h,i
    - b. b,h,j
    - c. c,c,e,f,g,k,l
    - d. g,m

12. Any three of the following:
    a. Durability
    b. Self-cleaning
    c. Highly reflective
    d. Dirt resistant
    e. Withstands moisture
    f. Resistant to stain and discoloration
    g. Good hiding or covering qualities
13. Evaluated to the satisfaction of the instructor.

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

TERMINAL OBJECTIVES

After completion of Unit IV, the student should be able to distinguish between the two common types of air cleaners, discuss in writing the importance of proper air-cleaner maintenance, and list the methods of cleaning the filter element. The student should demonstrate the ability to remove and clean the dry-type air cleaner and disassemble and service the oil-bath air cleaner. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Distinguish between the two common types of air cleaners when given the characteristics of each.
2. List the advantages of a dry-type air cleaner over an oil-bath cleaner.
3. Discuss in writing the importance of proper air-cleaner maintenance.
4. Select from a list the differences between dry-type air cleaners found in tractors and those found in automobiles.
5. List the methods of cleaning the filter element.
6. Demonstrate the ability to:
    a. Remove and clean the dry-type air cleaner.
    b. Disassemble and service the oil-bath air cleaner.

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in the job sheet
7. Give test

Students:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    TM 1--Oil-Bath Air Cleaner
    TM 2--Dry-Type Air Cleaner
4. Job sheets
    #1--Removing the Dry-Type Air Cleaner
    #2--Cleaning the Dry-Type Air Cleaner
    #3--Servicing the Oil-Bath Air Cleaner
5. Test
6. Answers to test

References:

1. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Maintenance. Athens, Georgia: Foote and Davis (Division of McCall Printing Company), 1970.

2. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Operation and Daily Care. Athens, Georgia: Foote and Davis (Division of McCall Printing), 1970.

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

INFORMATION SHEET

I. Two common types of air cleaners

  A. Oil-bath type (Transparency 1)

    1. Depends on washing the air free of dust particles by pulling it through a bath of oil

    2. Oil-bath cleaner should be serviced daily

    3. Operating under the conditions for which it is designed, the oil-bath cleaner is highly efficient

    (NOTE: It is not always operating under designed conditions, so the efficiency may be lower at times when the air flow drops below its rated capacity.)

  B. Dry (paper-filter) type (Transparency 2)

    1. Depends on a special paper to filter out dirt particles

    2. Dry-type cleaner normally needs servicing every 50 hours

    3. Built for two-stage cleaning

      a. Pre-cleaning

      b. Filtering

II. Advantages of a dry-type air cleaner over an oil-bath cleaner

  A. Easier to service

  B. Requires less frequent servicing

  C. Fuzz and chaff cause less restriction to air passage

  D. Less messy

  E. More efficient at a wide range of conditions

  F. Neglect of air-cleaner servicing does not harm the engine as long as there is no hole in the filter or a loose fitting where dirt can get through

  (NOTE: However excess fuel consumption may cause washing of cylinders, therefore, excess wear.)

INFORMATION SHEET

III. Importance of proper air-cleaner maintenance

A. Dirt, which enters the intake manifold of an engine and passes into the engine cylinders, mixes with the oil on the cylinder walls to form a grinding compound

B. Tractors operating under dusty conditions without an air filter have been known to wear so rapidly they require a major overhaul after operating fifteen hours or less

(NOTE: Manufacturers have made every effort to equip tractors with the most efficient air cleaner available so the owner will get the longest possible usage before an overhaul is necessary.)

IV. Difference in dry-type cleaner found in tractors and those in automobiles

A. Tractor cleaner is equipped with a pre-cleaner for removing large particles of dirt

B. The tractor cleaner has a filter element that is larger for the same horsepower engine

C. The tractor cleaner has a filter element that is much more ruggedly built to withstand vibration and high engine suction when clogged with dirt

(NOTE: Dust bowl should be cleaned daily or whenever dust dept is over manufactures recommendations. Also, automatic dust unloader should be checked out daily to see if it is functional.)

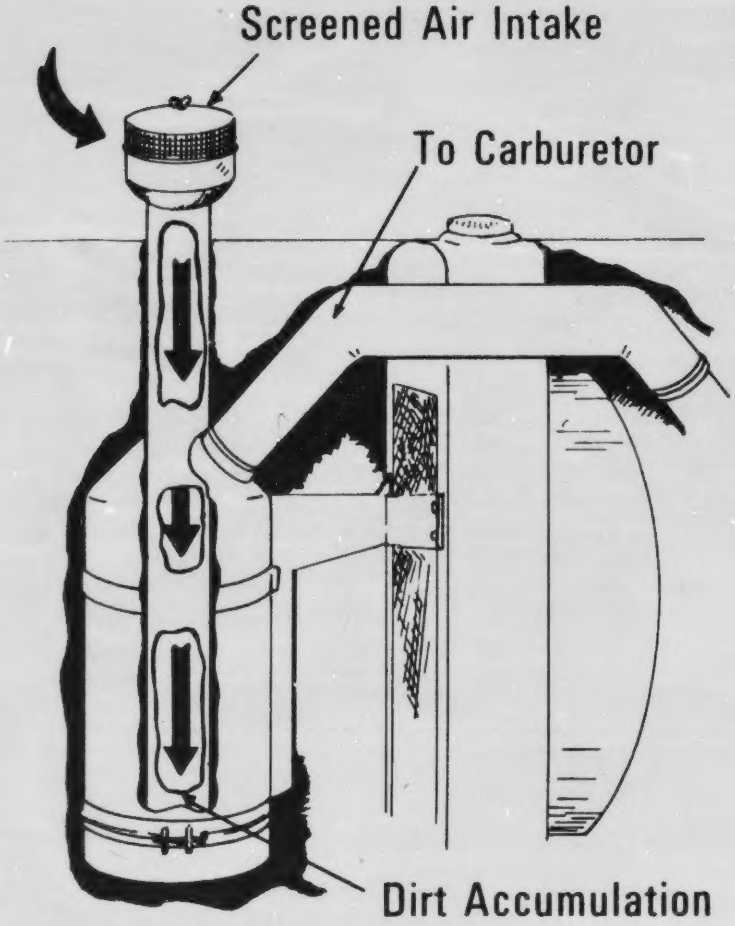
V. Methods of cleaning the filter element

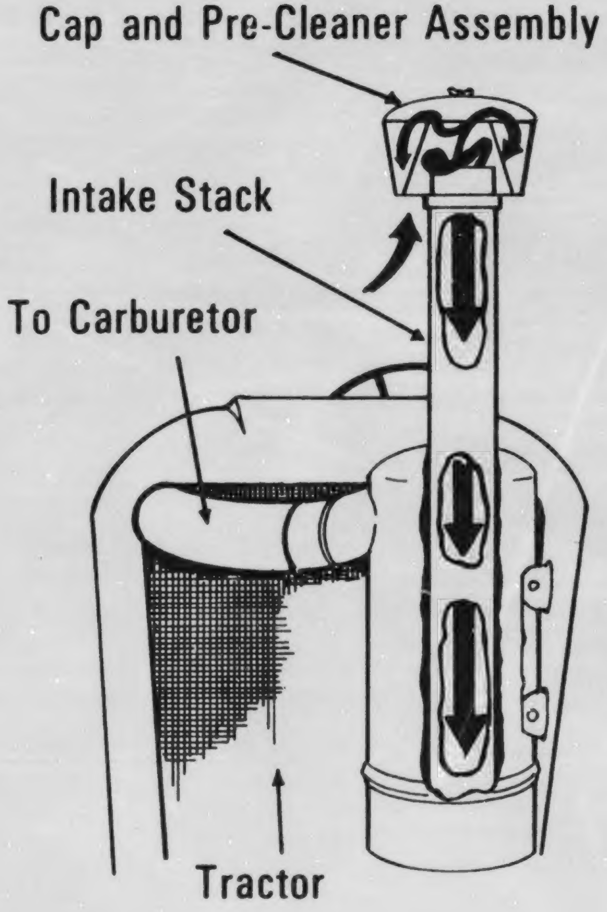
A. Tapping to loosen dust so it can be shaken out

B. Use of compressed air

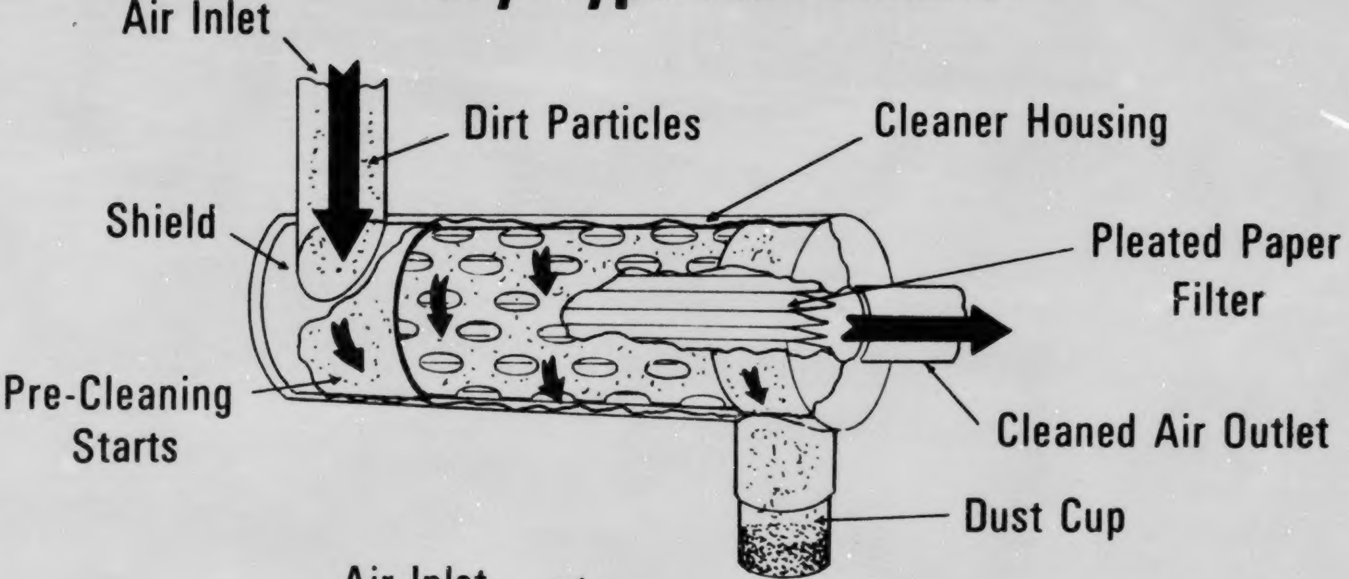
C. Washing with water and a detergent

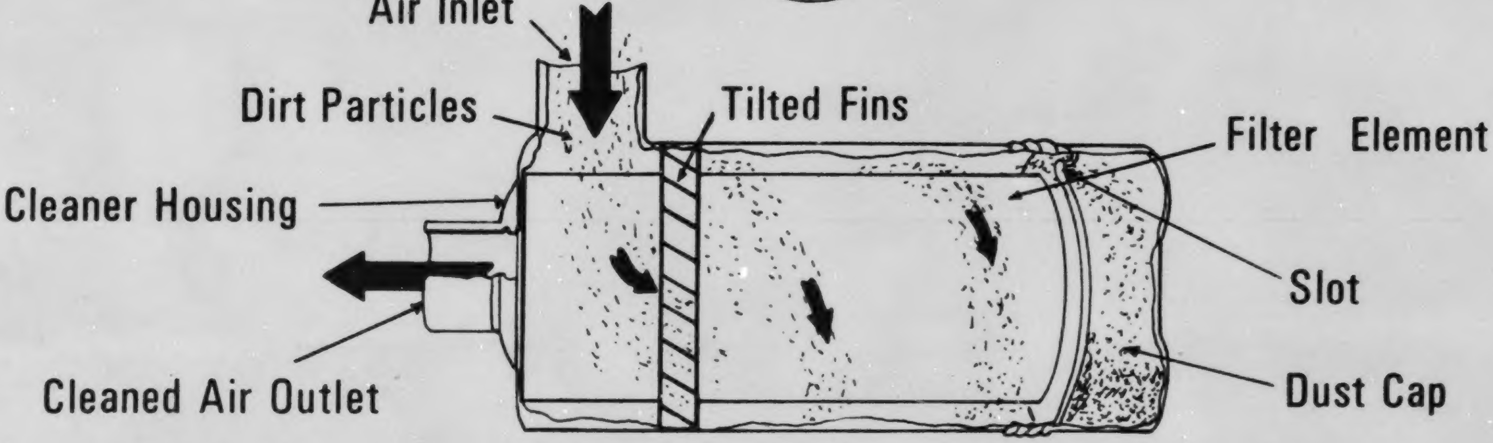
Oil-Bath Air Cleaner


Screened Air Intake
To Carburetor
Dirt Accumulation


Cap and Pre-Cleaner Assembly
Intake Stack
To Carburetor
Tractor

Dry-Type Air Cleaner


Air Inlet
Dirt Particles
Cleaner Housing
Shield
Pleated Paper Filter
Pre-Cleaning Starts
Cleaned Air Outlet
Dust Cup


Air Inlet
Dirt Particles
Tilted Fins
Filter Element
Cleaner Housing
Slot
Dust Cap
Cleaned Air Outlet

9

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

JOB SHEET #1--REMOVING THE DRY-TYPE AIR CLEANER

I. Tools and materials needed

A. Compressed air not to exceed 100 pounds per square inch of pressure

B. Bucket of warm water with a nonsudsing detergent

C. Water under pressure at not more than 40 pounds per square inch

II. Procedure

A. Stop engine if it is running

B. Squeeze dust unloader if supplied on the air cleaner

(NOTE: Some tractors are equipped with a connection to the engine exhaust system which will automatically unload the dirt from the pre-cleaner.)

C. Remove hood or grill, if necessary, to provide access to air cleaner unit

D. Wipe off dust accumulated around end of cleaner where element will be removed

E. Loosen hand screw or clamp that holds the end cap on the end of the cleaner and remove cap

F. Clean the area around the element and clean the dust cap and baffle on air cleaners having end cups

(NOTE: Use a dry cloth. Do not use gasoline, fuel oil, or solvents.)

G. Check condition of rubber gasket on end of filter element

(NOTE: If the gasket is damaged or missing, replace the filter element with a new one. Do not bother to clean it. If reinstalled, uncleaned air will pass directly from the pre-cleaner into the engine and cause rapid wear.)

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

JOB SHEET #2--CLEANING THE DRY-TYPE AIR CLEANER

I. Tools and materials needed

   A. Compressed air not to exceed 100 pounds per square inch of pressure

   B. Bucket of warm water with a nonsudsing detergent

   C. Water under pressure at not more than 40 pounds per square inch

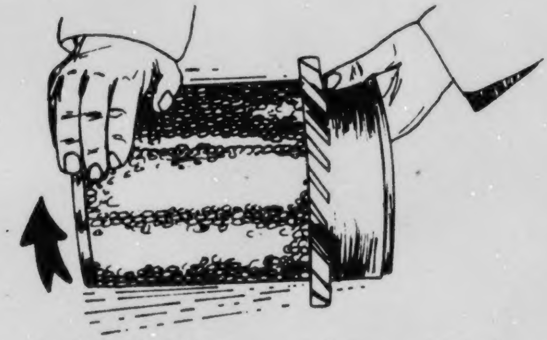
II. Procedure

   A. To clean the filter element by tapping, proceed as follows

      1. Tap filter element to loosen dirt, but gently enough that element is not damaged (Figure 1)

         (NOTE: You may tap the element carefully against the palm of your hand.)

FIGURE 1



      2. Rotate element during tapping procedure and shake out dust

   B. To clean the filter element with compressed air, proceed as follows

      1. Direct air from air nozzle against inside of filter element

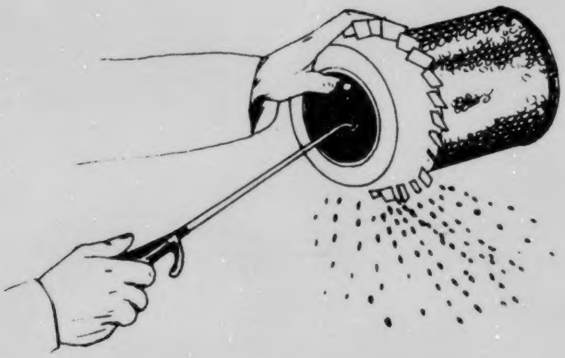
         (NOTE: Hold the air nozzle about an inch away from the inner screen of the element. Directing the air from the center to the outside--opposite normal air flow--loosens the outside dirt and opens the small passageways the paper filter. Blowing air from the outside to the center tends to compact the dirt in the small openings in the paper filter.

         It is helpful if the air nozzle is equipped with a deflector to spread the air to avoid blowing a hole in the filter element.

JOB SHEET #2

The air must be dry and pressure at the nozzle not exceed 100 pounds per square inch. (Figure 2)

FIGURE 2

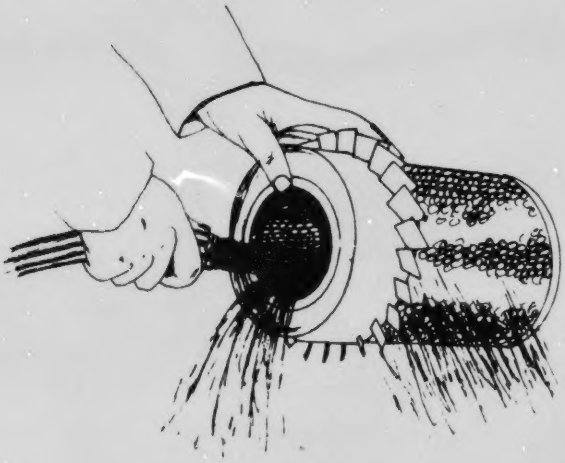


2. Continue blowing and rotating the element until it is clean

C. To clean the filter element by washing, proceed as follows

1. Clean away as much dirt as possible with clean water from a hose or use compressed air (Figure 3)

FIGURE 3

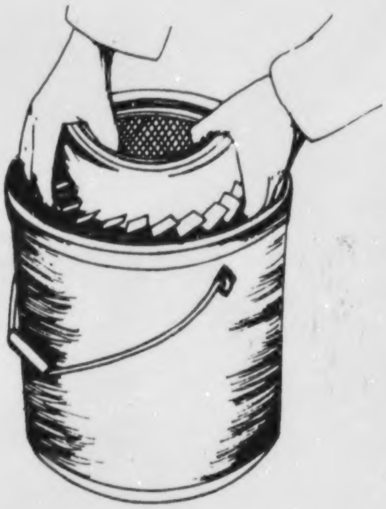


JOB SHEET #2

2. Wash element in warm water and detergent (Figure 4)

   (NOTE: Use a nonsudsing detergent. Do not use fuel oil, gasoline, or other petroleum solvents.)

   FIGURE 4



3. Rinse the element

   (NOTE: Use clean water as shown then shake excess water from element.)

4. Allow element time to dry

   (NOTE: Allow approximately 24 hours at 70 degrees for the drying time. Be sure you do not leave the wet element where it will be exposed to freezing weather.

   Do not use compressed air or engine air flow to dry the filter element. It will probably rupture the paper filter. Do not oven dry.)

5. Inspect element for damage--If there is slight rupture in the paper element, throw it away

6. To install the filter element, proceed as follows

   a. Replace the filter element in the cleaner; be certain engine is not running when the element is replaced

   b. Tighten wing nut (with fingers only) that holds element in place

   c. Complete remaining procedures in reverse order from those used to remove the filter element.

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

JOB SHEET #3--SERVICING THE OIL-BATH AIR CLEANER

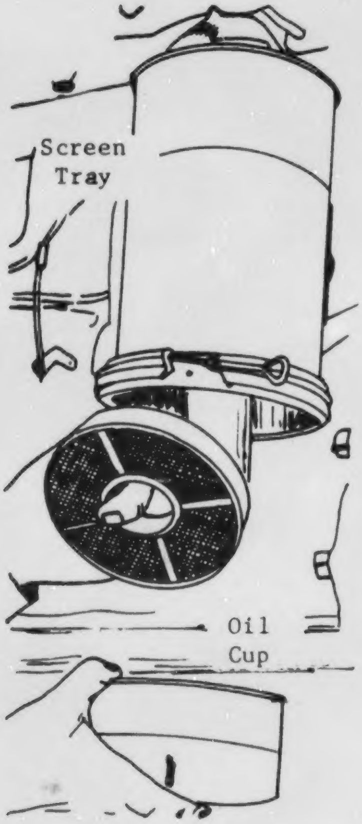
I. Tools and materials needed

- A. Cleaning rags
- B. Large container of cleaning solvent (kerosene or diesel fuel)
- C. Set of open-end wrenches
- D. Screwdriver
- E. Pliers
- F. Stick about three feet long
- G. Cup or pitcher

II. Procedure

- A. Remove oil cup and screen try (Figure 1)

FIGURE 1



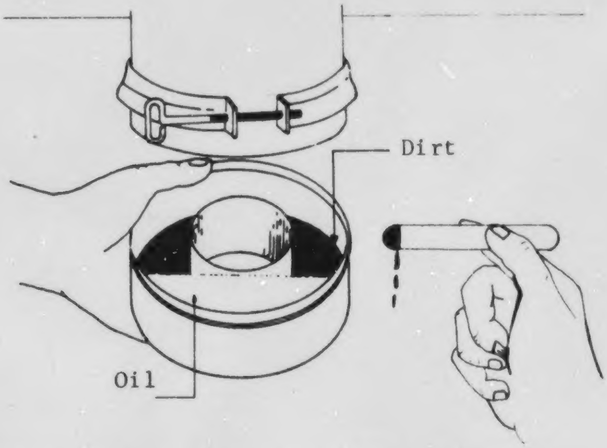
(NOTE: Some air cleaners have no screen tray.)

JOB SHEET #3

B. Check depth of sediment deposit in outer chamber (Figure 2)

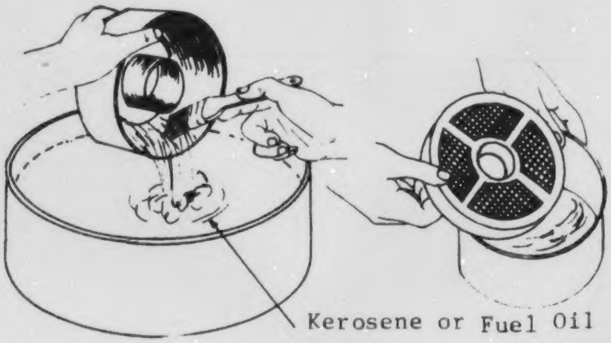
(NOTE: If sediment in the outer compartment is more than 1/2 inch in depth, proceed with cleaning the cup. If the oil has thickened even though the dirt depth may not be 1/2 inch, change the oil.)

FIGURE 2



C. If cup needs cleaning, throw away dirty oil, scrape, then wash inner and outer cups with clean kerosene, mineral spirits, or diesel fuel (Figure 3)

FIGURE 3

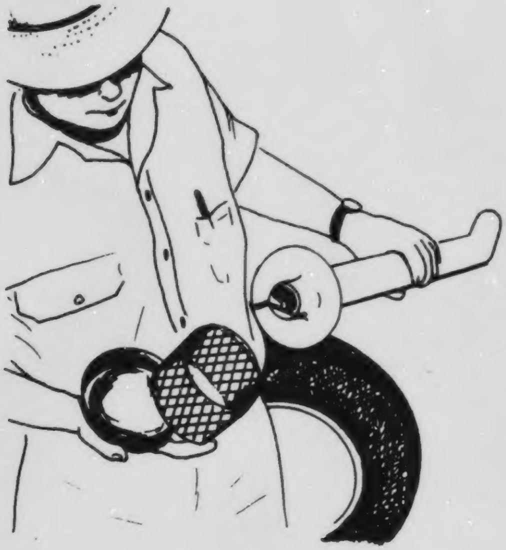


JOB SHEET #3

D. Inspect center tube and lower filter element

(Note: If both the center tube and lower filter appear dirty, remove the complete filter body for adequate cleaning. If tractor has a vertical stack with a pre-cleaner on top, remove that assembly first. (Figure 4)

FIGURE 4

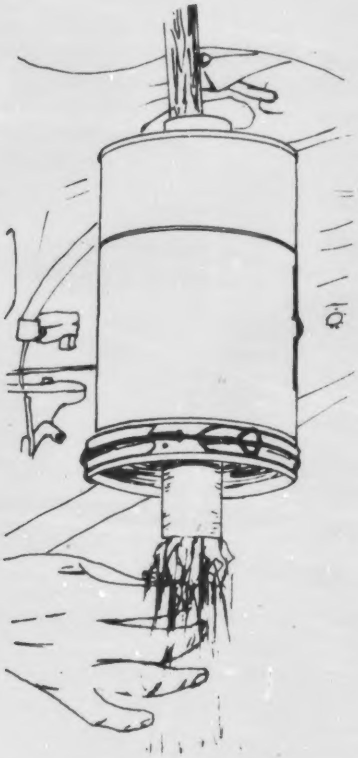


JOB SHEET #3

E. Remove dirt from center tube (Figure 5)

(Note: Use a lintless cloth soaked with diesel fuel or kerosene and push it through the center tube with a stick. Some center tubes are smaller at the lower end so be careful not to damage the tube.)

FIGURE 5

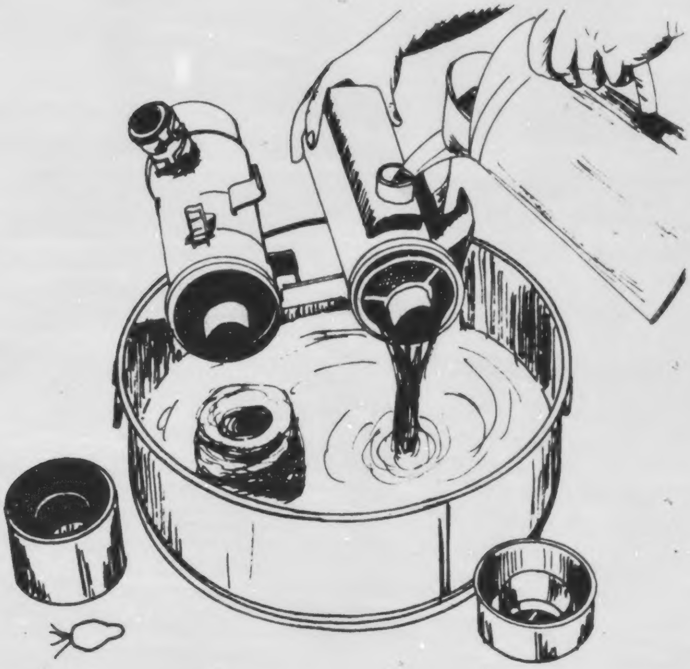


JOB SHEET #3

F. Clean dirt from lower filter

(NOTE: On many filters there is an upper and lower filter (separation screen) that makes up the filter element. On most elements the lower filter can be removed. If the filtering element is held in place by spot welding or other means, flush the cleaning solvent through the mesh as shown in figure below.)

FIGURE 6



G. Clean shell and upper metal-wool filter

(NOTE: Soak the entire assembly in kerosene or fuel oil, then flush with clean solvent to remove the loosened oil and dust or manufacturer recommendations.)

H. Drain filter body and screen for several minutes

(NOTE: Do not use gasoline for cleaning)

I. Clean the screened air intake cap or pre-cleaner

J. Check hose connections

K. Refill cup with oil to "oil level" mark

(NOTE: Most operator's manuals recommend the same weight oil as used in the engine crankcase.)

JOB SHEET #3

L. Reassemble filter parts

(NOTE: Be sure all connections are tight and any worn or damaged hoses or gaskets replaced. If there is any place where uncleaned air can enter the air ducts, particularly after the air has passed through the cleaner, dirt and grit will enter and greatly increase tractor wear.)

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

TEST

1. Place an "O" by the characteristics that apply to an oil-bath type air cleaner and "D" by the characteristics that apply to a dry-type air cleaner.

   _____a. Normally needs servicing every 50 hours

   _____b. Depends on washing the air free of dust particles by pulling it through a bath of oil

   _____c. Depends on a special paper to filter out dirt particles

   _____d. Should be serviced daily

2. Name three advantages of a dry-type air cleaner over an oil-bath cleaner.

   a.

   b.

   c.

3. Discuss in writing why proper air-cleaner maintenance is important.

4. Select from the list below the differences between dry-type air cleaners found in tractors and those found in automobiles. Place an "X" by the statements that are correct.

   _____a. Tractor cleaner is equipped with a pre-cleaner for removing large particles of dirt

   _____b. The automobile cleaner has a filter element that is larger for the same horsepower engine

   _____c. The tractor cleaner has a filter element that is much more ruggedly built to withstand vibration and high engine suction when clogged with dirt

5. List three methods of cleaning the filter element.

   a.

   b.

   c.

6. Demonstrate the ability to:

   a. Remove and clean the dry-type air cleaner

   b. Disassemble and service the oil-bath air cleaner

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

SERVICING THE TRACTOR--AIR SUPPLY SYSTEM
UNIT IV

ANSWERS TO TEST

1. a. D

   b. O

   c. D

   d. O

2. Any three of the following:

   a. Easier to service

   b. Requires less frequent servicing

   c. Fuzz and chaff cause less restriction to air passage

   d. Less messy

   e. More efficient at a wide range of conditions

   f. Neglect of air cleaner servicing does not harm the engine as long as there is no hole in the filter or a loose fitting where dirt can get through

3. a. Dirt, which enters the intake manifold of an engine and passes into the engine cylinders, mixes with the oil on the cylinder walls to form a grinding compound

   b. Tractors operating under dusty conditions without an air filter have been known to wear so rapidly they required a major overhaul after operating fifteen hours or less

4. a

   c

5. a. Tapping to loosen dust so it can be shaken out

   b. Use of compressed air

   c. Washing with water and a detergent

6. Performance skills will be evaluated to the satisfaction of the instructor.

SERVICING WHEEL BEARINGS
UNIT V

TERMINAL OBJECTIVES

After the completion of Unit V, the student should be able to name the common causes of wheel bearing failures and identify the components of a wheel assembly. He should be able to disassemble, clean, and pack and assemble wheel bearings. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After the completion of this unit, the student should be able to:

1. Explain in writing the importance of wheel bearing service.
2. Select from a list the proper service interval for wheel bearings.
3. Name the common causes of wheel bearing failures.
4. Identify the components of a wheel assembly.
5. Demonstrate the ability to:
    a. Disassemble the wheel bearings
    b. Clean the wheel bearings
    c. Pack and assemble the wheel bearings

SERVICING WHEEL BEARINGS
UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparency
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in the job sheets
7. Give test

Students:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency master
    TM 1--Components of a Wheel Assembly
4. Job sheets
    #1--Disassemble the Wheel Bearings
    #2--Clean the Wheel Bearings
    #3--Pack and Assemble the Wheel Bearings
5. Test
6. Answers to test

References:

1. American Association for Instructional Materials. Tractor Maintenance. Athens, Georgia: Foote and Davis (Division of McCall Printing Company), 1970.

2. National 4-H Tractor Program Development Committee. 4-H Tractor Program Third Year. Chicago, Illinois: National 4-H Service Committee, 1963.

SERVICING WHEEL BEARINGS
UNIT V

INFORMATION SHEET

I. Importance of wheel-bearing service--Due to work in dusty areas, tractor wheel bearings are often subjected to needless wear if not properly adjusted and lubricated

(NOTE: If grit and dirt particles are allowed to enter the bearings, damage begins to show on the raceway. If this continues, the bearing will soon be ruined and have to be replaced.)

II. Proper service interval for wheel bearings

A. Interval varies from 500 to 1,200 hours

B. Check tractor operator's manual for recommendations on a given tractor

(NOTE: The wheel-bearing service interval has been gradually lengthened as manufacturers have found better methods of protecting the bearings from dirt and water. The fact that wheel bearings are serviced infrequently makes it all the more important to do it regularly and properly.)

C. If tractor has a grease fitting for gun lubrication, grease daily or twice per day

D. Wheel bearings should be serviced at least once per year

III. Causes of wheel bearing failures

A. Faulty dust seal

B. Improper lubrication

C. Loose bearings

D. Operating wheels under water

E. Operating the tractor with a heavy load on the wheel bearings

F. Operating with bearings too tight

IV. Components of a wheel assembly (Transparency 1)

A. Spindle

B. Oil seal

C. Oil seal cup

INFORMATION SHEET

D. Inner bearing cone and roller

E. Inner bearing cup

F. Hub

G. Outer bearing cup

H. Outer bearing cone and roller

I. Wheel

J. Washer

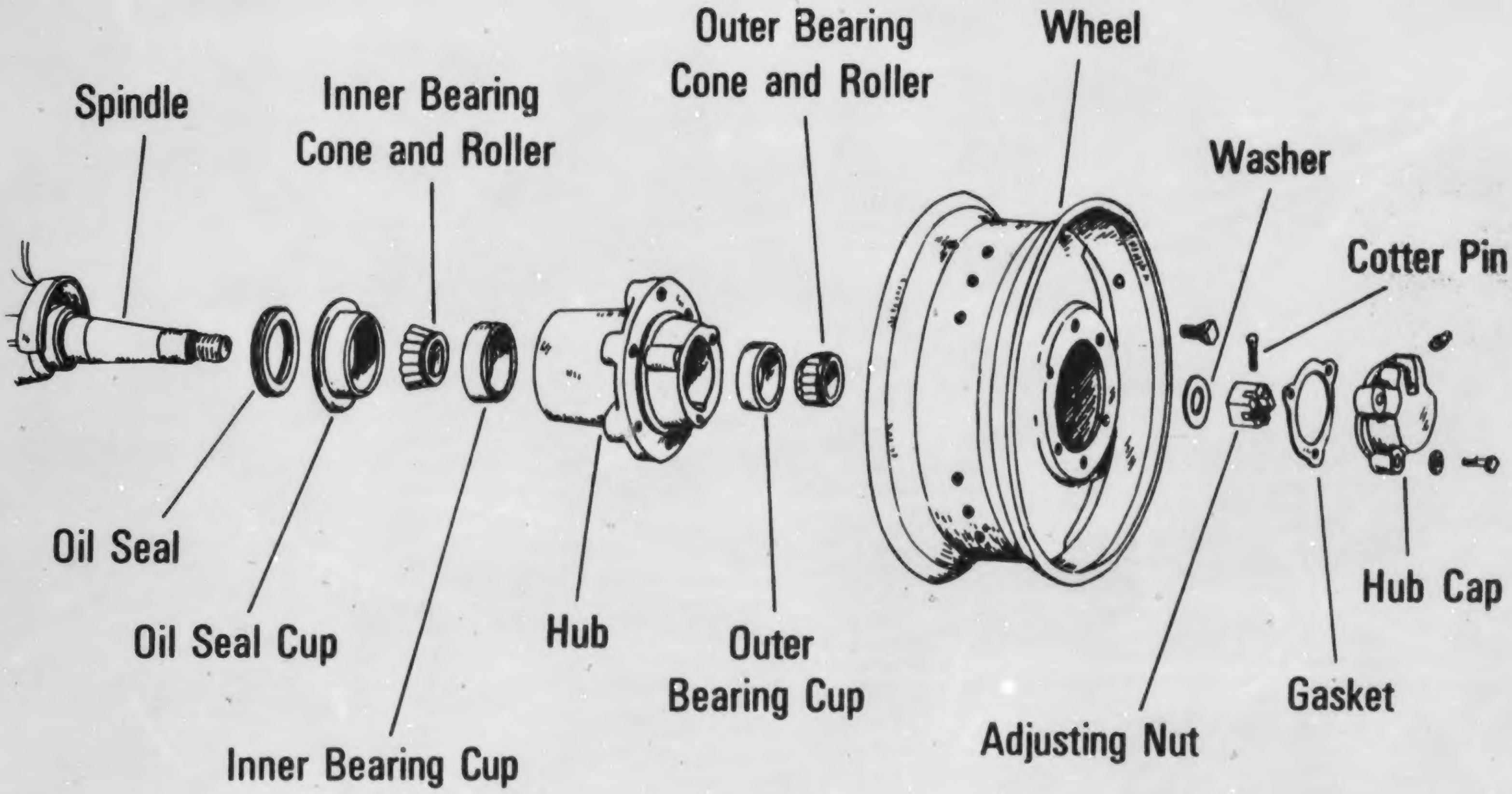
K. Adjusting nut

L. Cotter pin

M. Gasket

N. Hub cap

Components of a Wheel Assembly


Spindle
Inner Bearing Cone and Roller
Outer Bearing Cone and Roller
Wheel
Washer
Cotter Pin
Oil Seal
Oil Seal Cup
Inner Bearing Cup
Hub
Outer Bearing Cup
Adjusting Nut
Gasket
Hub Cap

639

640

SERVICING WHEEL BEARINGS
UNIT V

JOB SHEET #1--DISASSEMBLE THE WHEEL BEARINGS

I. Tools and materials needed

  A. Set of open-end wrenches

  B. Diagonal pliers

  C. Clean rags

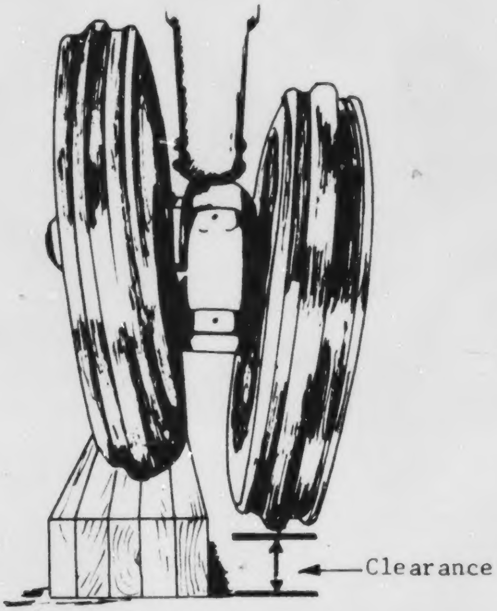
  D. Wood block, about 6 inches high (for dual-wheel, tricycle tractors) or small hydraulic jack

II. Procedure

  A. Raise wheel off the ground

  (NOTE: With many dual-wheel tricycle tractors, you can provide clearance for one wheel by running the other up on a six-inch block as shown in Figure 1. If your tractor has a wide front axle, jack up one wheel at a time. Be sure your tractor is in gear or block the rear wheels so it will not move forward or backward. Use caution to keep tractor from falling off jack. A stand or safety jack should be used.)

FIGURE 1

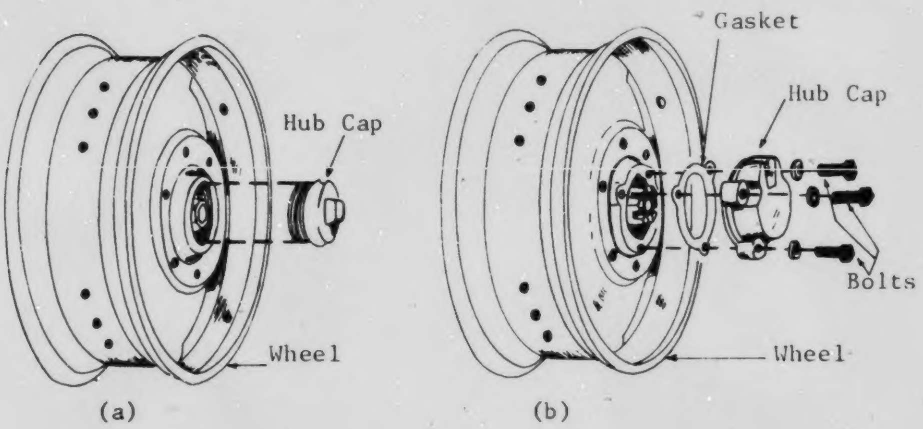


JOB SHEET #1

B. Clean dirt from wheel and hub cap and remove hub cap

(NOTE: Most hub caps are either threaded and screwed on the hub (Figure 2a) or are held in place with three stud bolts (Figure 2b). The latter has a gasket under it. Remove the cap carefully so as not to damage the gasket.)

FIGURE 2

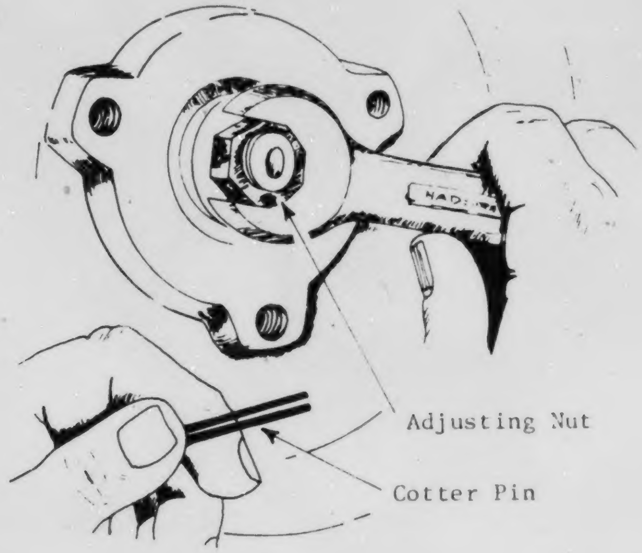

Hub Cap
Wheel
Gasket
Hub Cap
Bolts
Wheel

Threaded and Screwed On (a)

Held With Stud Bolts (b)

C. Remove cotter pin and adjusting nut (Figure 3)

FIGURE 3

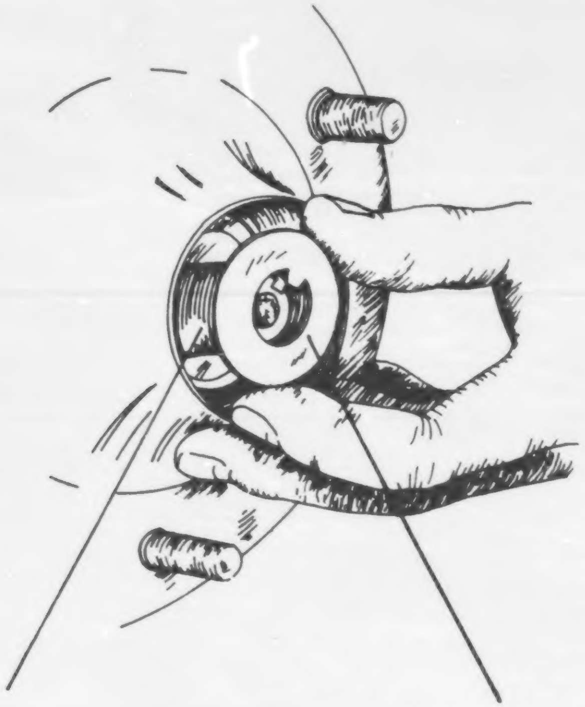

Adjusting Nut
Cotter Pin

JOB SHEET #1

(Note: Use diagonal pliers for straightening cotter pin and for removing it. Lay all parts on a clean cloth or in a clean pan. It is very important to keep all of the bearing parts free from dirt. Once dirt enters the moving parts of a bearing, it is not easily removed, even in the cleaning solution. Do not use the hub cap as a container unless you can clean it first, and do not put the bearing parts on the floor.)

D. Remove thrust washer and outer bearing (Figure 4)

FIGURE 4



Outer Bearing Cone and Roller
Thrust Washer

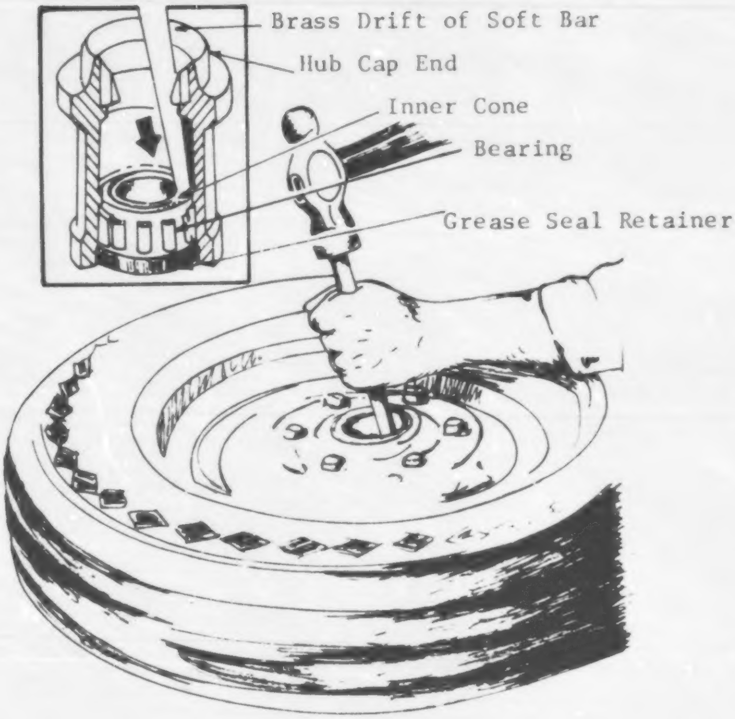
(Note: If the washer and outer bearing are not loose, shake the wheel gently to dislodge them. Hold your hand under the hub to keep the parts from falling on the floor.)

JOB SHEET #1

E. Pull wheel off the spindle

(NOTE: On some tractors the grease-seal retainer is pressed into the hub and holds the rollers and inner cone in position. With this type the bearing and seal will come off with the wheel and remain in the hub until tapped out. (Figure 5) On other tractors the grease-seal retainer remains on the spindle when the wheel is removed, which leaves the inner-bearing cone free to either come off with the wheel or remain on the spindle. If you are not certain which type of grease retainer seal is used on your tractor, hold your hand so you can catch the inner bearing as you remove the wheel, in case it should be of the latter type.)

FIGURE 5


Brass Drift of Soft Bar
Hub Cap End
Inner Cone
Bearing
Grease Seal Retainer

SERVICING WHEEL BEARINGS
UNIT V

JOB SHEET #2--CLEAN THE WHEEL BEARINGS

I. Tools and materials needed

A. Clean rags

B. Container with cleaning solvent

C. Small (2") brush

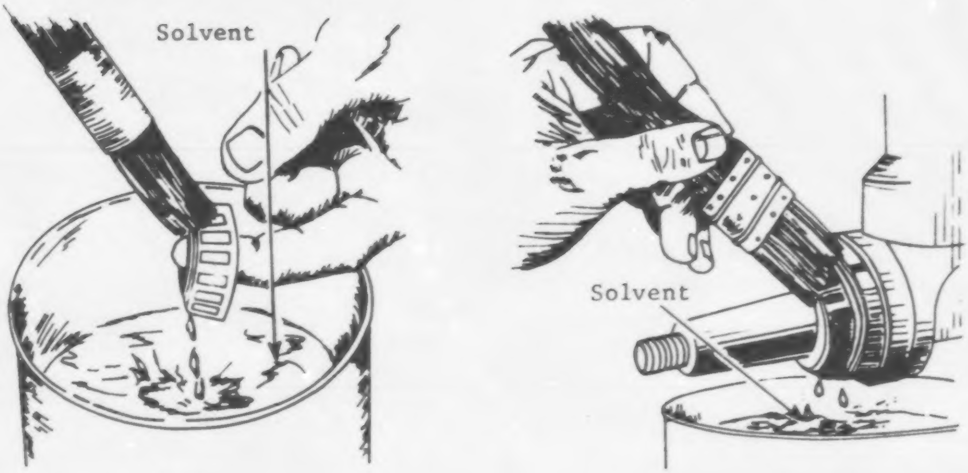
D. Compressed air (if available)

II. Procedure

A. Wash bearings thoroughly

(NOTE: "Swish" the bearing in the cleaning solution (kerosene or diesel fuel) and use a stiff-bristle brush to help loosen old grease deposits. (Figure 1a) If the inner bearing is on the spindle and can not be removed easily, clean grease seal and bearing in place.) (Figure 1b)

FIGURE 1



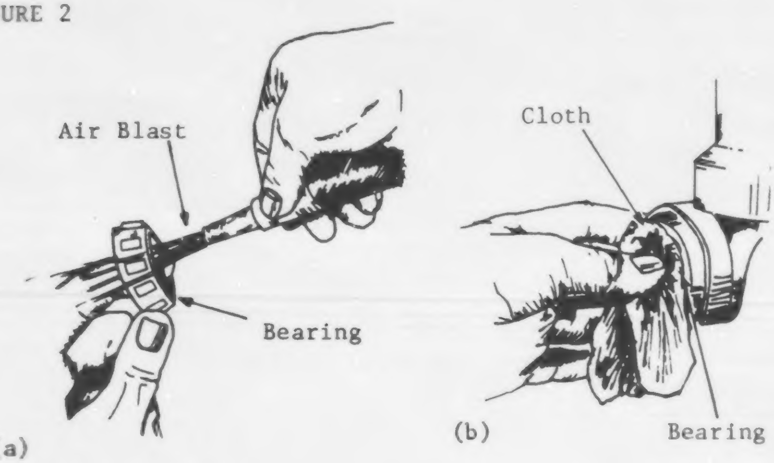
(a) (b)

JOB SHEET #2

B. Remove solvent from bearings and other washed parts

(NOTE: If dry compressed air is available, it may be used for drying the bearings but hold the bearing cone so the air blast will not spin it (Figure 2a). Spinning a dry bearing causes rapid wear and it may ruin both the rollers and raceways. If the air contains moisture, do not use it. Moisture blown into the bearings will cause them to rust. Drying with a clean, dry cloth is satisfactory (Figure 2b) but be sure the cloth is free of dirt, dust, and lint.)

FIGURE 2



C. Examine bearings for wear

(NOTE: If there is evidence of much wear or corrosion, replace both parts of bearing. If inner bearing is tight on the spindle and you wish to remove it, loosen with a wood dowel and hammer. Tap lightly.)

D. Examine grease-retainer ring and seal--Replace if damaged

(NOTE: If it has been damaged (ruptured, distorted, or cracked) it should be replaced particularly for wheels with bearings that are packed only once every 500 hours or once a year. It is this seal that keeps the grease in and keeps out dirt and moisture. Much damage can be done during the interval between wheel packings if the seal leaks. Some manufacturers recommend that the seal be replaced each time a wheel bearing is repacked.)

E. Clean hub, hub cap, and spindle with solvent

SERVICING THE WHEEL BEARINGS
UNIT V

JOB SHEET #3--PACK AND ASSEMBLE THE WHEEL BEARINGS

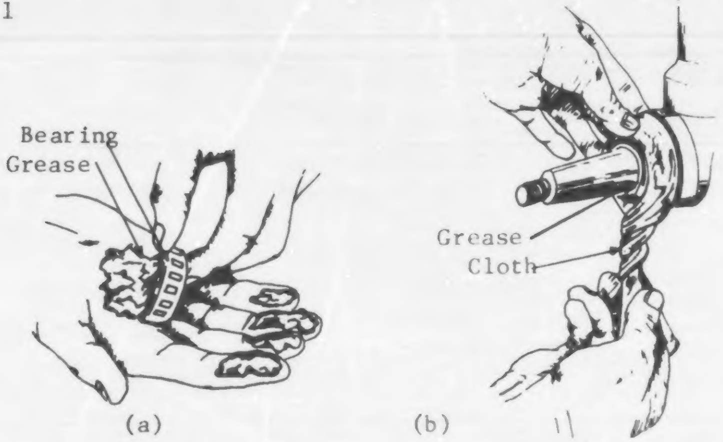
I. Tools and materials

- A. Set of open-end wrenches
- B. Diagonal pliers
- C. Clean rags
- D. Multi-purpose grease
- E. New cotter pins

II. Procedure

A. Pack each bearing with grease (Figure 1)

FIGURE 1



(a) (b)

(NOTE: Methods of packing bearings; (a) Place grease in hand, then push grease into bearing by pressing bearing against your palm and rotating it. Work grease entirely through bearing and between rollers. (b) If inner bearing is left on spindle, apply about two tablespoons of grease to outer portions, wrap a clean cloth around bearing, twist ends of cloth until it binds tightly around bearing. Use hand to press grease into bearing.)

B. Replace inner bearing and Grease-retainer seal if removed originally

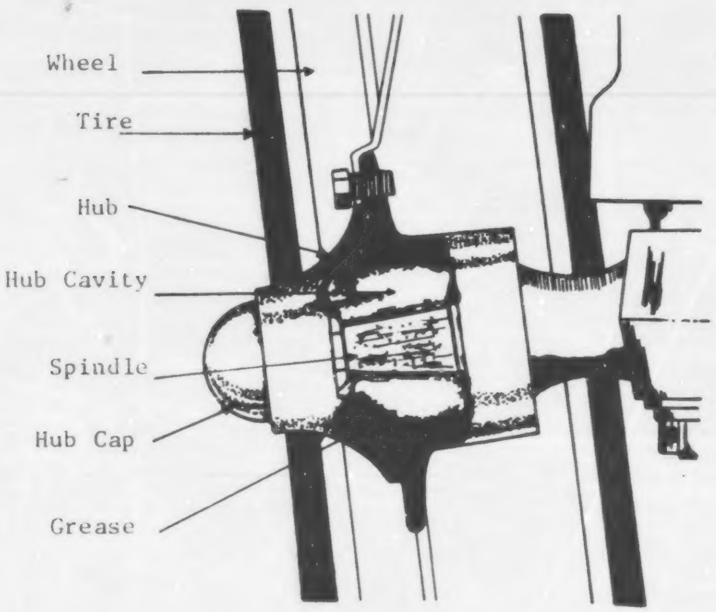
(NOTE: Replace in opposite sequence from that of removal whether being replaced on the spindle or in the hub. You may have to tap the grease-retainer seal lightly and evenly around the edges to set it.)

JOB SHEET #3

C. Coat spindle and inside of hub with grease

(NOTE: Most manufacturers recommend only a thin coating of grease--just enough to prevent rust and to help prevent entrance of dirt and water. This leaves ample air space in the hub for the grease to expand without building up pressure which will force the grease past the seal. However, there are a few companies that insist the groove, or cavity in the hub between the two roller bearings, should be filled with grease. (Figure 2) Even this practice provides considerable air space around the spindle. Check your operator's manual.)

FIGURE 2



D. Position wheel on spindle and install outer bearing

(NOTE: Be extremely careful that dirt doesn't fall from the tire or wheel on the spindle or bearing.)

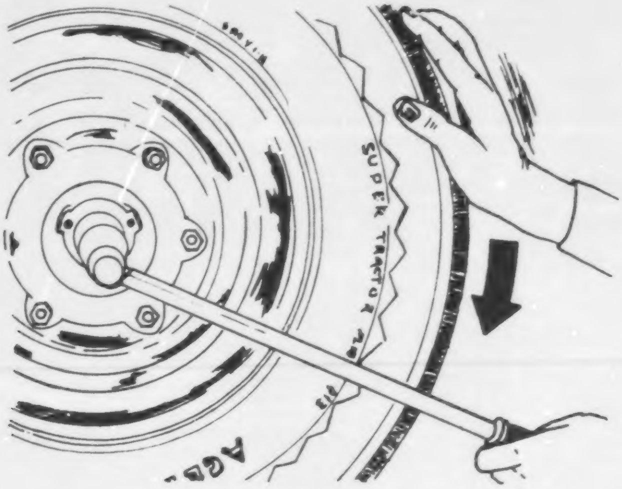
E. Install thrust washer and slotted adjusting nut.

JOB SHEET #3

F. Turn wheel and tighten slotted adjusting nut until wheel "drags" then loosen

(NOTE: The slotted adjusting nut is also called a "castellated" nut. Use caution while tightening (Figure 3) to avoid overtightening. Turn the wheel slowly as you tighten the nut until a slight bind is felt. The slight bind means that all surfaces are in contact. Then loosen the nut until the nearest slot (castellation) is aligned with the hole in the spindle. Some manufacturers recommend loosening the nut as much as 1/6 to 1/3 turn.)

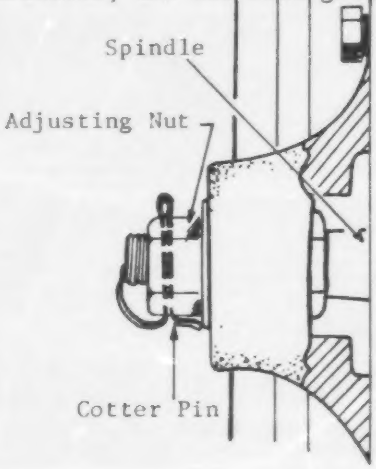
FIGURE 3



G. Lock nut with cotter pin

(NOTE: Use a new cotter pin. Insert pin, then use diagonal pliers and pull one leg of pin outward and up over the end of the spindle. (Figure 4) Cut excess off the other cotter pin leg and bend leg backwards against nut. This assures the pin staying in place. Do not overlook this step. If the pin if not installed, the nut will gradually loosen and the wheel will come off.)

FIGURE 4



H. Replace hub cap

SERVICING WHEEL BEARINGS
UNIT V

TEST

1. Explain in writing the importance of wheel bearing service.

2. Select from the list below the proper service interval for wheel bearings. Place an "X" by the correct answers.

   _____a. Interval varies from 500 to 1,200 hours

   _____b. In the winter the bearings should be serviced more often

   _____c. If tractor has a grease fitting for gun lubrication, grease daily or twice per day

3. Name three causes of wheel bearing failures.

   a.

   b.

   c.

4. Identify the components of a wheel assembly by matching the terms below with the numbers found on the enclosed drawing.

   _____a. Wheel

   _____b. Cotter pin

   _____c. Outer bearing cone and roller

   _____d. Hub

   _____e. Oil seal

   _____f. Spindle

   _____g. Oil seal cap

   _____h. Inner bearing cone and roller

   _____i. Inner bearing cup

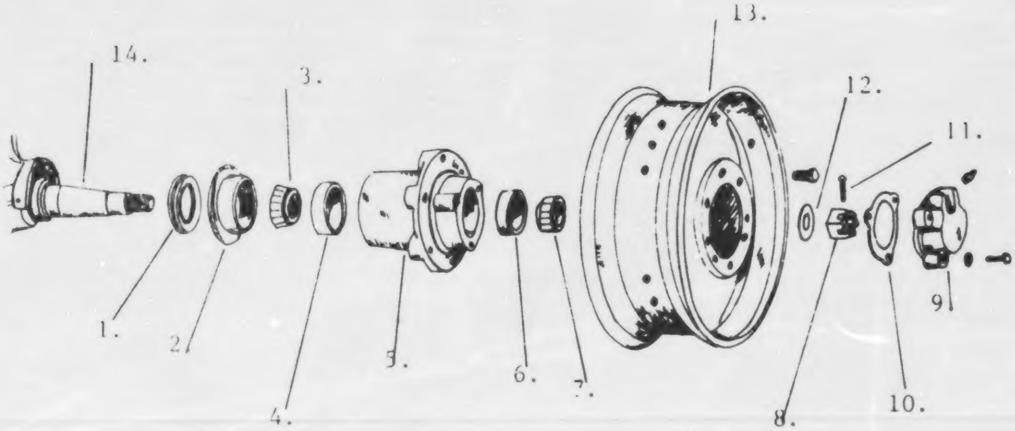
   _____j. Washer

_____k. Adjusting nut

_____l. Hub cap

_____m. Gasket

_____n. Outer bearing cup



5. Demonstrate the ability to:

   a. Disassemble the wheel bearings.

   b. Clean the wheel bearings

   c. Pack and assemble the wheel bearings.

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

SERVICING WHEEL BEARINGS
UNIT V

ANSWERS TO TEST

1. Due to work in dusty areas, tractor wheel bearings are often subjected to needless wear if not kept properly adjusted or lubricated

2. a

   c

3. Any three of the following:

   a. Faulty dust seal

   b. Improper lubrication

   c. Loose bearings

   d. Operating wheels under water

   e. Operating the tractor with a heavy load on the wheel bearings

   f. Operating with bearings too tight

4. a. 13

   b. 11

   c. 7

   d. 5

   e. 1

   f. 14

   g. 2

   h. 3

   i. 4

   j. 12

   k. 8

   l. 9

m. 10

n. 6

5. Performance skills will be evaluated to the satisfaction of the instructor.

BATTERY SERVICE
UNIT VI

TERMINAL OBJECTIVES

After completion of Unit VI, the student should be able to explain the functions and construction of a battery. He should be able to remove and replace a battery using correct safety procedures. He should be able to clean, service, and check a battery. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms and definitions associated with battery construction and testing.
2. Name two functions of a battery.
3. List two rules associated with battery safety.
4. Demonstrate the ability to:
    a. Remove, clean, service, and replace a battery.
    b. Check a battery with a hydrometer.

BATTERY SERVICE
UNIT VI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparency
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Students:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective sheet
2. Information sheet
3. Transparency master
    - TM 1--Battery Construction
4. Job sheets
    - #1--Remove, Clean, Service, and Replace a Battery
    - #2--Check a Battery With a Hydrometer
5. Test
6. Answers to test

References:

1. Fundamentals of Service Electrical Systems Manual. Moline, Illinois: John Deere and Company, 1968.

2. Billiet, Walter E. and Leslie F. Goings. Automotive Electrical Systems. Third Edition. Chicago, Illinois: American Technical Society, 1970.

3. Crouse, William H. Automotive Mechanics. New York: Webster Division, McGraw-Hill Book Company, 1965.

4. Tractor Maintenance: Principles and Procedures. American Association for Vocational Instructional Materials.

BATTERY SERVICE
UNIT VI

INFORMATION SHEET

I. Terms associated with

A. Battery construction (Transparency 1)

1. Plates--Store active materials which bring about the chemical reaction to provide electricity
2. Separators--Insulate the negative plates from the positive plates
3. Electrolyte--Solution of water and sulphuric acid
4. Cell--Consists of plates of two different materials immersed in an electrolyte solution that reacts chemically to produce electricity
5. Battery case--Holds the cells and electrolyte to make up the completed battery
6. Vent caps--Close the opening in each cell cover and provide a vent to allow gases to escape
7. Positive post--The larger of the two battery posts
8. Negative post--The smaller of the two battery posts

B. Battery testing

1. Specific gravity--The weight of a solution compared to distilled water that has a reading of 1.000
2. Hydrometer--An instrument which measures specific gravity of the electrolyte

II. Functions of a battery

A. To supply current for starting the engine

B. To supply current when the demand exceeds the output of the charging system

C. To stabilize the voltage in the system during operation

III. Battery safety

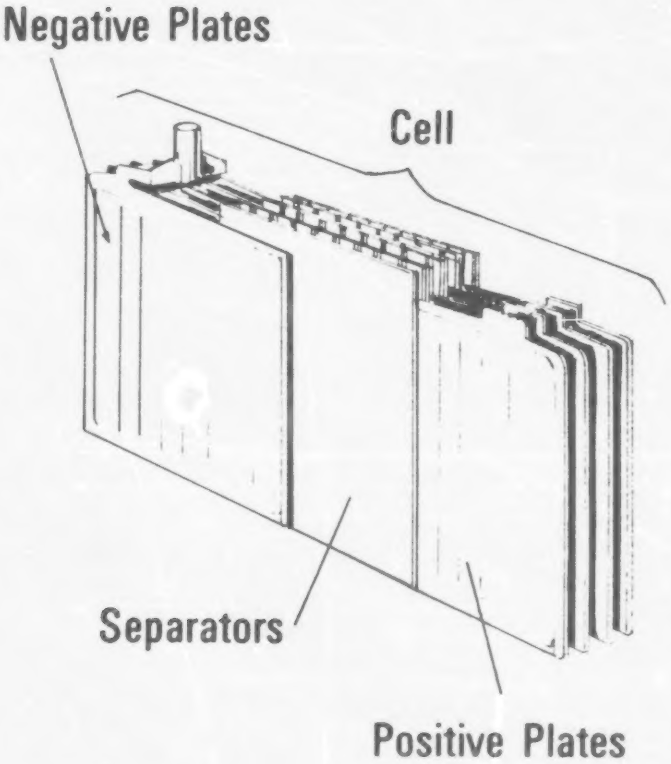
A. Battery electrolyte must not be allowed to spill or come in contact with clothing, skin, eyes, or car paint

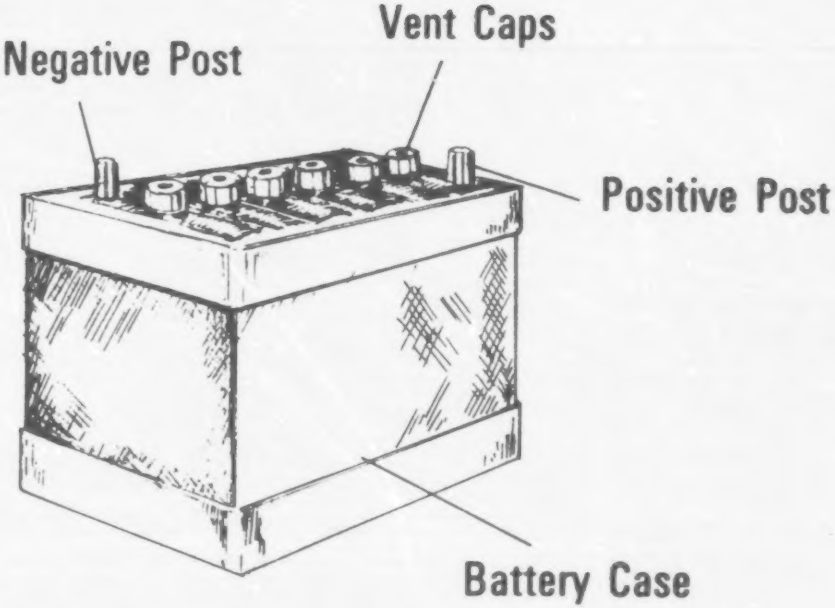
INFORMATION SHEET

B. Flames or sparks must be kept away from a battery as the gases given off by a battery are very explosive

C. Avoid shorting or grounding the battery during service or removal

Battery Construction


Negative Plates
Cell
Separators
Positive Plates


Negative Post
Vent Caps
Positive Post
Battery Case

BATTERY SERVICE
UNIT VI

JOB SHEET #1--REMOVE, CLEAN, SERVICE, AND REPLACE A BATTERY

I. Tools and equipment

   A. Bristle brush

   B. Wire brush

   C. Screwdriver

   D. Battery clamp puller

   E. Combination end wrenches, 7/16" - 9/16"

   F. Battery cable spreader

   G. Baking soda and water solution--(two tablespoons of baking soda to one pint of water)

   H. Battery anti-corrosion paste

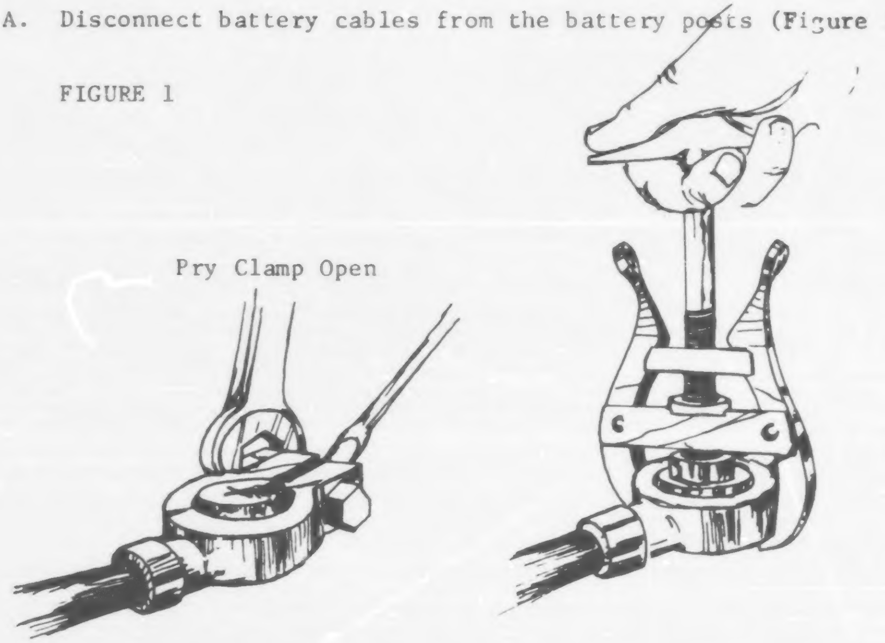
   I. Battery post and cable cleaner

   J. Battery lift strap

II. Procedure

   A. Disconnect battery cables from the battery posts (Figure 1)

FIGURE 1



(NOTE: Always disconnect the grounded battery cable first to avoid short circuits.)

JOB SHEET #1

B. Remove the battery hold-down

C. Remove the battery from the machine

(NOTE: Use a suitable battery lift strap to lift the battery from the battery tray.)

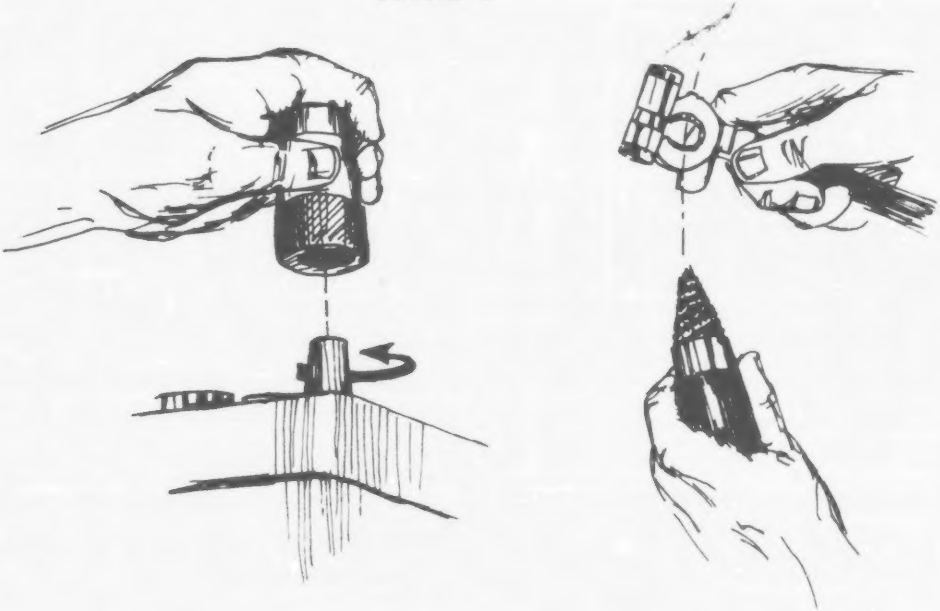
D. Inspect the battery tray for dirt or corrosion

(NOTE: Clean with baking soda and water as required.)

E. Check battery cables for worn or frayed insulation

F. Clean battery cable clamps and battery post (Figure 2)

FIGURE 2

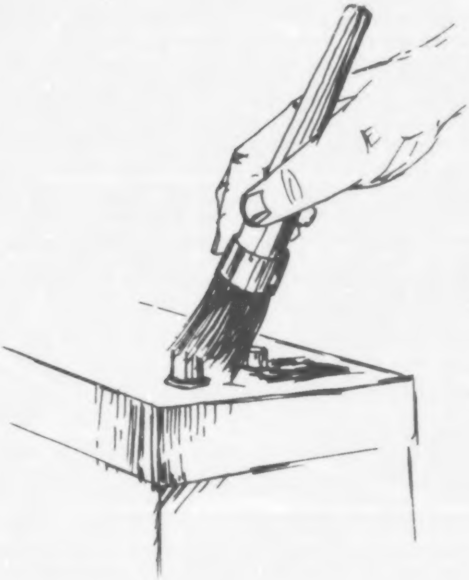


(NOTE: Battery posts and inside of battery cable clamps must be clean and bright.)

JOB SHEET #1

G. Remove loose dirt and corrosion particles from top of battery (Figure 3)

FIGURE 3



H. Brush soda water solution on battery, battery post, clamps, and battery hold-down (Figure 4)

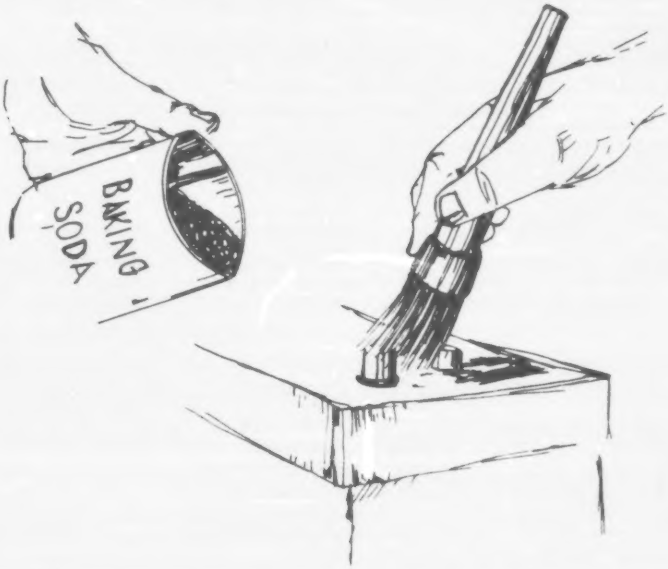


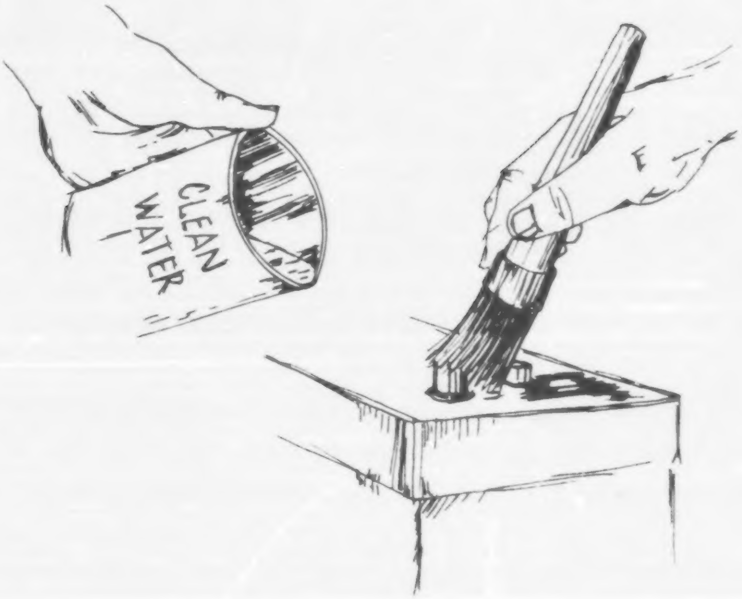
FIGURE 4

(NOTE: Keep water and soda from entering the battery through the vent holes in the vent caps.)

JOB SHEET #1

I. Wash away residue with clean water (Figure 5)

FIGURE 5



(NOTE: Remove all residue that may have lodged around battery, frame, or parts of the vehicle.)

J. Dry the battery and battery cables with a clean cloth

K. Set the battery into place using a lift strap

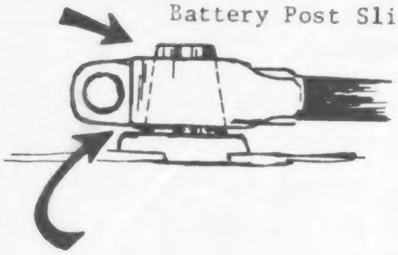
(NOTE: Position the battery to allow for correct battery cable attachment.)

L. Install the battery hold-down clamp or strap and tighten securely

JOB SHEET #1

M. Reconnect battery cables to the battery posts (Figure 6)

FIGURE 6



Correct Battery Cable Position

(NOTE: Always reconnect the power cable first and the ground cable last.)

N. Tighten the battery cable clamps securely

(NOTE: Use care to avoid twisting the battery cable post.)

O. Spread a coating of battery anti-corrosion paste over the cable clamps and terminals

P. Remove vent caps and check electrolyte level in all cells

Q. Add water if necessary to bring electrolyte up to proper level

(NOTE: Do not overfill.)

BATTERY SERVICE
UNIT VI

JOB SHEET #2--CHECK A BATTERY WITH A HYDROMETER

I. Tools and equipment

A. Shop towels

B. Hydrometer

II. Procedure

A. Remove vent caps from battery

B. Insert the hydrometer into the first cell

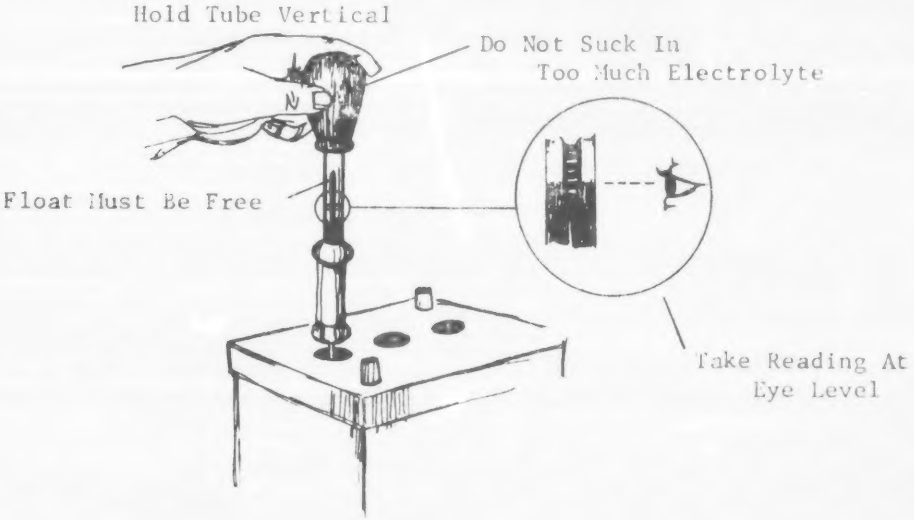
C. Squeeze the rubber bulb to draw electrolyte into the hydrometer to suspend the float

(NOTE: If the electrolyte level is too low, add water, charge for one hour, and recheck.)

D. Make sure the float is not bumping the top of the hydrometer tube or sticking to the side of the tube

E. Take reading at eye level (Figure 1)

FIGURE 1


Hold Tube Vertical
Do Not Suck In Too Much Electrolyte
Float Must Be Free
Take Reading At Eye Level

(NOTE: Write down reading for each cell.)

JOB SHEET #2

F. Squeeze bulb to return electrolyte to cell

G. Repeat for other cells

H. Adjust the readings for temperature

(NOTE: Add four gravity points (0.004) to the reading for every 10 degrees F. above 80 degrees. Subtract four gravity points (0.004) for each 10 degrees below 80 degrees F.)

I. Specific gravity should read from 1.215 to 1.270 (corrected for 80 degrees F. electrolyte temperature)

J. The variation in readings between cells should be no more than 0.050

K. If the readings are not within the above mentioned range, further testing will be required

L. Replace vent caps upon completion of test

BATTERY SERVICE
UNIT VI

TEST

1. Match the following terms with the correct definitions.

_____a. Plates

_____b. Separators

_____c. Electrolyte

_____d. Cell

_____e. Battery case

_____f. Vent caps

_____g. Hydrometer

_____h. Positive post

_____i. Specific gravity

_____j. Negative post

1. Solution of water and sulphuric acid
2. The larger of the two battery posts
3. Close the opening in each cell cover and provide a vent to allow gases to escape
4. Insulate the negative plates from the positive plates
5. Store active materials which bring about the chemical reaction to provide electricity
6. The smaller of the two battery posts
7. Consists of plates of two different materials immersed in an electrolyte solution that reacts chemically to produce electricity
8. Holds the cells and electrolyte to make up the completed battery
9. The weight of a solution compared to distilled water that has a reading of 1.000
10. An instrument which measures specific gravity of the electrolyte

2. Name two functions of a battery.

a.

b.

3. List two rules associated with battery safety.

   a.

   b.

4. Demonstrate the ability to:

   a. Remove, clean, service, and replace a battery.

   b. Check a battery with a hydrometer.

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

BATTERY SERVICE
UNIT VI

ANSWERS TO TEST

1. a. 5
   b. 4
   c. 1
   d. 7
   e. 8
   f. 3
   g. 10
   h. 2
   i. 9
   j. 6

2. Any two of the following:

   a. To supply current for starting the engine

   b. To supply current when the demand exceeds the output of the charging system

   c. To stabilize the voltage in the system during operation

3. Any two of the following:

   a. Battery electrolyte must not be allowed to spill or come in contact with clothing, skin, eyes, or car paint

   b. Flames or sparks must be kept away from a battery as the gases given off by a battery are very explosive

   c. Avoid shorting or grounding the battery during service or removal

4. Performance skills will be evaluated to the satisfaction of the instructor.

SERVICING THE TRACTOR--LUBRICATION SYSTEM
UNIT VII

TERMINAL OBJECTIVES

After the completion of Unit VII, the student should be able to name the purposes of the lubrication system and select the rules to use when selecting engine oil. He should be able to identify three types of filter assemblies and match the SAE letter designation with the API and ASTM description. The student should demonstrate the ability to change crankcase oil and replace the oil filter. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After the completion of this unit, the student should be able to:

1. Match terms associated with the lubrication system when given the correct definition.
2. Name the purposes of the lubricating system.
3. Select from a list the conditions that affect crankcase oil change intervals.
4. Identify three types of filter assemblies.
5. Match the SAE letter designation to the API and ASTM description.
6. Select from a list the general rules to use when selecting engine oils.
7. List the steps to use when storing and handling engine oils.
8. Demonstrate the ability to:
    a. Change crankcase oil.
    b. Replace the oil filter.

SERVICING THE TRACTOR--LUBRICATION SYSTEM
UNIT VII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Student:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Purposes of Lubricants
    - TM 2--Types of Filter Assemblies
4. Job sheets
    - #1--Changing Crankcase Oil
    - #2--Replacing an Oil Filter
5. Test
6. Answers to test

References:

1. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Maintenance. Athens, Georgia: Foote and Davis (Division of McCall Printing Company), 1970.

2. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Fuels and Lubricants. Athens, Georgia: Foote and Davis (Division of McCall Printing Company), 1970.

3. Fundamentals of Service, Fuels, Lubricants, and Coolants. Moline, Illinois: John Deere Service Publications, 1970.

4. API Institute Bulletin (current)

SERVICING THE FARM TRACTOR--LUBRICATION SYSTEM
UNIT VII

INFORMATION SHEET

I. Terms and definitions

   A. Friction--The resistance to movement between any two objects placed in contact with each other

   B. Viscosity--A measure of the ability of an oil to flow

   C. API--American Petroleum Institute

   D. SAE--Society of Automotive Engineers

   E. Oil pan--A cover on the bottom of the engine providing a reservoir for the engine oil

   F. Oil filter--A device used to strain the engine oil thus removing abrasive particles

   G. ASTM--American Society for Testing Materials

   H. MIL--Specifications prepared by the Ordinance Department of the U.S. Army, Navy, and Air Force

   I. Synthetic Oil--An oil derived from non-petroleum products which are subject to some API standards as petroleum oil

II. Purposes of lubrication system (Transparency 1)

   A. Lubricates moving parts to minimize power loss from friction

   B. Acts as a cooling agent to remove heat from engine parts

   C. Forms a seal between piston rings and cylinder walls

   D. Acts as a cleaning agent

   E. Absorbs shock between bearings and other parts

III. Conditions that affect oil change intervals

   A. Engine design

   B. Kind of fuel used

   C. Oil capacity in relation to the size and horsepower of the engine

   D. Load temperature under which the tractor operates

   E. Dirt conditions under which the tractor operates

INFORMATION SHEET

IV. Filter assemblies (Transparency 2)

  A. Filter bowl held in position with a through bolt

  B. Filter cartridge held in place with cap and through bolt

  C. "Spin-on" double filters with their own outer shells

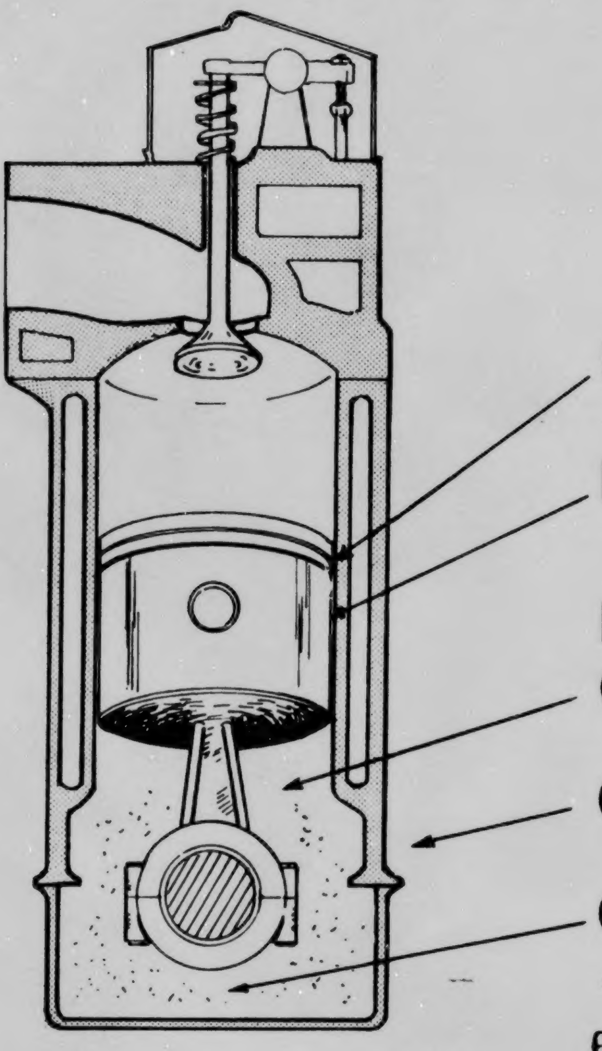
V. Oil classifications

	API Brief Identification and Engine Service Description	ASTM Engine Oil Description
SA	UTILITY GASOLINE & DIESEL ENGINE SERVICE Service typical of engines operated under such mild conditions that the protection afforded by compounded oils is not required. This classification has no performance requirements.	Oil without additive except that it may contain pour and/or foam depressants.
SB	MINIMUM DUTY GASOLINE ENGINE SERVICE Service typical of engines operated under such mild conditions that only minimum protection afforded by compounding is desired. Oils designed for this service have been used since the 1930's and provide only anti-scuff capability, and resistance to oil oxidation and bearing corrosion.	Provides some anti-oxidant and anti-scuff capabilities.
SC	1964 GASOLINE ENGINE WARRANTY SERVICE Service typical of gasoline engines in 1964 through 1967 models of passenger cars and trucks operating under engine manufacturers' warranties in effect during those model years. Oils designed for this service provide control of high and low temperature deposits, wear, rust and corrosion in gasoline engines.	Oil meeting the 1964-1967 requirements of the automobile manufacturers. Intended primarily for use in passenger cars. Provides low temperature anti-sludge and anti-rust performance.
SD	1968 GASOLINE ENGINE WARRANTY SERVICE Service typical of gasoline engines in passenger cars and trucks beginning with 1968 models and operating under engine manufacturers' warranties. Oils designed for this service provide more protection from high and low temperature engine deposits, wear, rust and corrosion in gasoline engines than oils for API Service Classification SC and may be used when oils for API Service Classification SC are recommended.	Oil meeting the requirements of the automobile manufacturers since 1968. Intended promarily for use in passenger cars. Provides low temperature anti-sludge and anti-rust performance.
SE	1972 GAS ENGINE WARRANTY MAINTENANCE SERVICE Service typical of gasoline engines in passenger cars and some trucks beginning with 1972 and certain 1971 models operating under engine manufacture is warranties. Oils designed for this service provide more protection against oil oxidation, high temperature engine deposits, rust and corrosion in gasoline engines than oils which are satisfactory for API Engine Service SD or SC and may be used when either of these classifications is recommended.	Oil meeting the 1972 requirements of the automobile manufacturers. Intended primarily for use in passenger cars. Provides high temperature anti-oxidation, low temperature anti-sludge and anti-rust performance.

INFORMATION SHEET

	API Brief Identification and Engine Service Description	ASTM Engine Oil Description
CA	LIGHT DUTY DIESEL ENGINE SERVICE Service typical of diesel engines operated in mild to moderate duty with high quality fuels. Occasionally has included gasoline engines in mild service. Oils designed for this service were widely used in the late 1940's and 1950's. These oils provide protection from bearing corrosion and from high temperature deposits in normally aspirated diesel engines when using fuels of such quality that they impose no unusual requirements for wear and deposit protection.	Oil meeting the requirements of MIL-L-2104A. For use in gasoline and naturally aspirated diesel engines operated on low sulphur fuel. The MIL-L-2104A Specification was issued in 1954.
CB	MODERATE DUTY DIESEL ENGINE SERVICE Service typical of diesel engines operated in mild to moderate duty, but with lower quality fuels which necessitate more protection from wear and deposits. Occasionally has included gasoline engines in mild service. Oils designed for this service were introduced in 1949. Such oils provide necessary protection from bearing corrosion and from high temperature deposits in normally aspirated diesel engines with higher sulfur fuels.	Oil for use in gasoline and naturally aspirated diesel engines. Includes MIL-L-2104A oils where the diesel engine test was run using high sulfur fuel.
CC	MODERATE DUTY DIESEL & GASOLINE ENGINE SERVICE Service typical of lightly supercharged diesel engines operated in moderate to severe duty and has included certain heavy-duty, gasoline engines. Oils designed for this service were introduced in 1961 and used in many trucks and in industrial and construction equipment and farm tractors. These oils provide protection from high temperature deposits in lightly supercharged diesels and also from rust, corrosion and low temperature deposits in gasoline engines.	Oil meeting requirements of MIL-L-2104B. Provides low temperature anti-sludge, anti-rust and lightly supercharged diesel engine performance. The MIL-L-2104B specification was issued in 1964.
CD	SEVERE DUTY DIESEL ENGINE SERVICE Service typical of supercharged diesel engines in high-speed, high-output duty requiring highly effective control of wear and deposits. Oils designed for this service were introduced in 1955, and provide protection from bearing corrosion and from high temperature deposits in supercharged diesel engines when using fuels of a wide quality range.	Oil meeting the requirements of the Caterpillar Tractor Co. Series 3 specification. Provides moderately supercharged diesel engine performance. The Series 3 specification was established by Caterpillar in 1955. The related MIL-L-45199B specification was issued in 1968.

Purposes of Lubricants



Seals

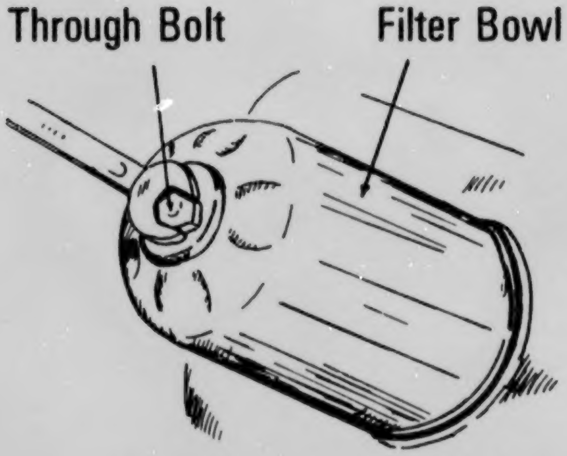
Lubricates

Reduces Rust and Corrosive Action

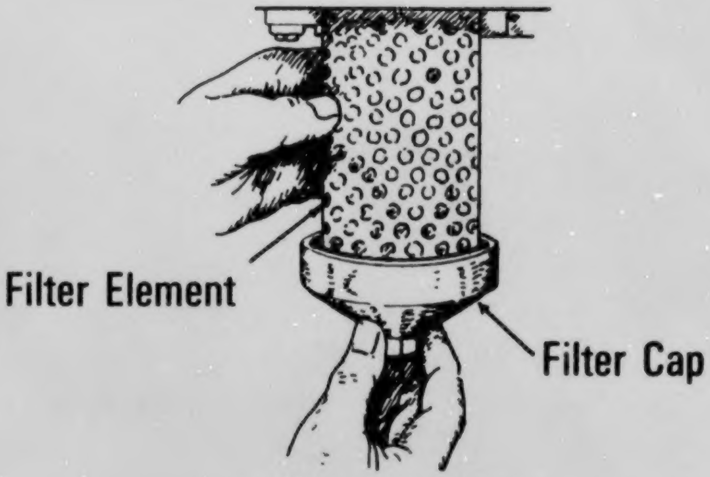
Carries Off Heat

Cleans

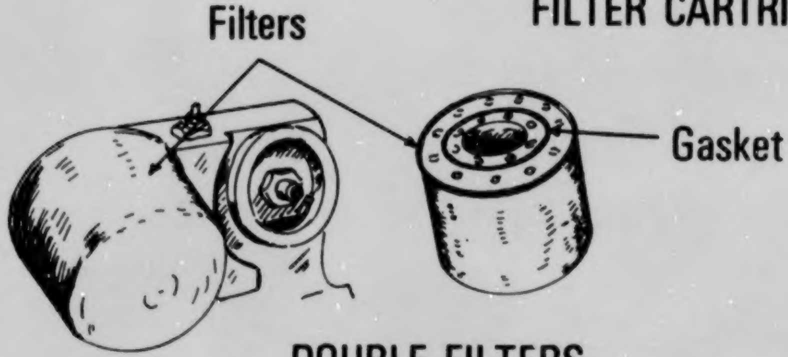
Types of Filter Assemblies


Through Bolt
Filter Bowl

FILTER BOWL


Filter Element
Filter Cap

FILTER CARTRIDGE


Filters
Gasket

DOUBLE FILTERS

SERVICING THE FARM TRACTOR--LUBRICATION SYSTEM
UNIT VII

JOB SHEET #1--CHANGING CRANKCASE OIL

I. Tools and materials needed

A. Wrench for drain plug

B. Clean rags

C. Container for old oil

D. New oil of grade and type recommended for your tractor

II. Procedure

A. Operate engine until thoroughly heated

(NOTE: Oil will drain more completely while hot; more of the contaminants are removed while the oil is still agitated. If crankcase is drained while oil is cold, some of the more highly contaminated oil may remain in the engine.)

B. Remove drain plug (clean if of magnetic type)

(NOTE: Use a wrench that fits the drain plug, not a pair of pliers. Pliers will gradually round off the corners of the plug until it will be difficult to either remove or tighten it.)

C. Allow crankcase to drain for several minutes

(NOTE: This allows time for oil to drain from various parts of the engine. This is important in order to remove as much dirt laden oil as possible.

If it is time for an oil filter change, remove the filter while oil is being drained.)

D. Replace drain plug

(NOTE: If drain plug is equiped with a gasket, be sure it is in place on the drain plug. Tighten the plug. (Do not overtighten or cross thread.) If filter element was removed, install a new one. Follow procedures in Job Sheet #2.)

E. Refill crankcase with new oil

(NOTE: Be extra careful that the tops of oil cans are thoroughly clean (Figure 1). Check the funnel, or any containers you may be using, to make certain they are free of dirt (Figure 2). No amount of filtering will completely take the place of the care you use when you refill with new oil.

JOB SHEET #1

One or more extra quarts will probably be needed, if you changed oil filters, to recharge the new filter. Check the operator's manual for the requirements of your tractor.

Use the viscosity and type of oil recommended in your operator's manual.)

FIGURE 1

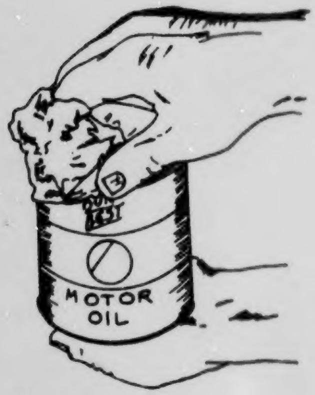
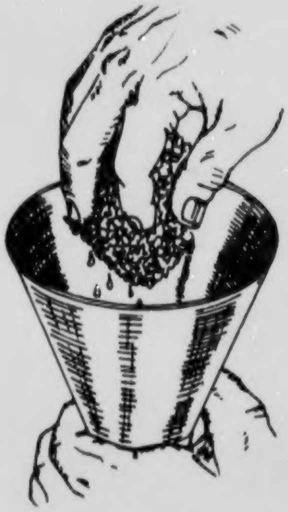


FIGURE 2



F. Start engine and operate it for a few minutes at a low rpm (revolutions per minute)

(NOTE: This gives the oil an opportunity to fill the oil filter and establish a true level on the dip stick.

Also check the pressure gage to make certain the oil pump is working properly.)

G. Check for oil leaks

(NOTE: Observe area around drain plug and around filter element if filter was changed.)

H. Check oil level on dip stick

(NOTE: If oil is not to the "full" line, add until it reaches that level. Do not overfill; this increases oil consumption and causes oil foaming.)

I. Store used oil in a drum or small closed container

SERVICING THE TRACTOR-LUBRICATION SYSTEM
UNIT VII

JOB SHEET #2--REPLACING AN OIL FILTER

1. Tools and materials needed

   A. New filter cartridge

   B. Clean rags

   C. Container to catch waste oil

   D. Wrenches, if needed to loosen or tighten filter cap or bowl

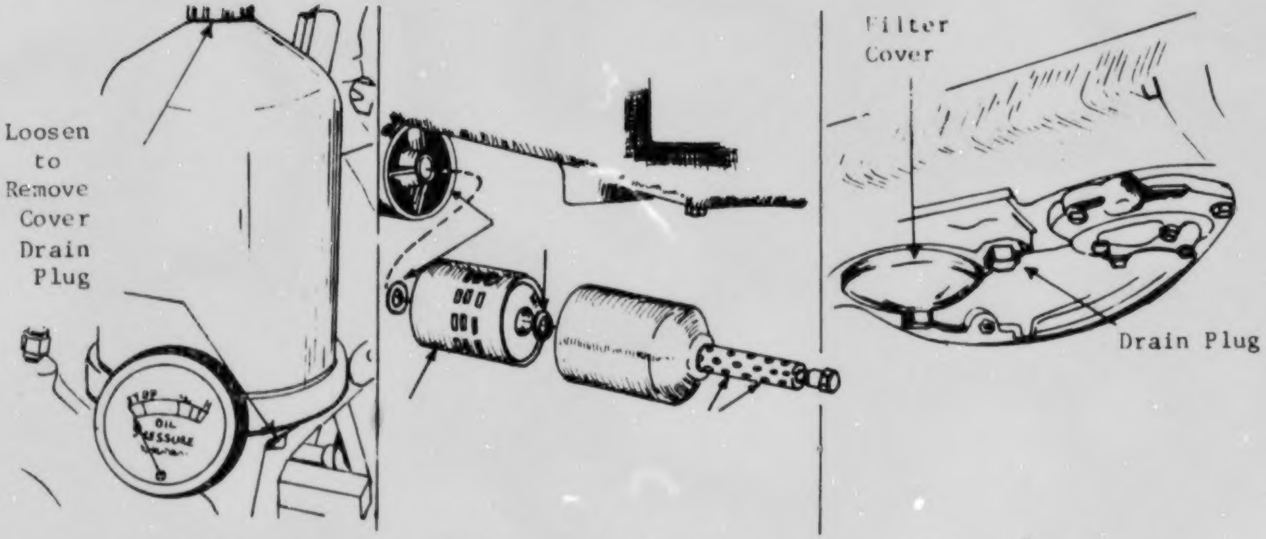
   E. Cleaning solvent--Kerosene or diesel fuel

11. Procedure

   A. Find location of oil filter

   (Note: See Figure 1.)

FIGURE 1


Loosen to Remove Cover Drain Plug
OIL PRESSURE
Filter Cover
Drain Plug

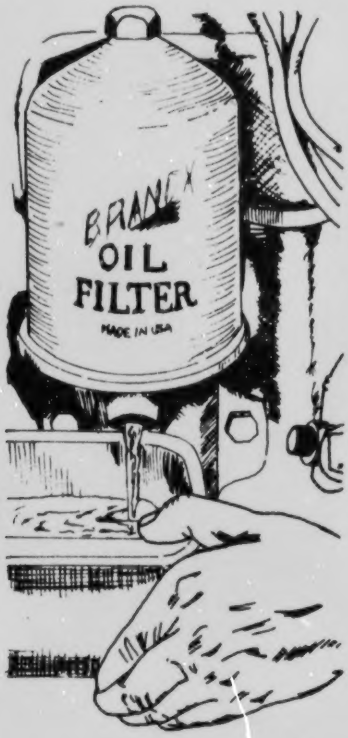
Side of Engine   Under Engine Crankcase   Inside Crankcase

   B. Wipe dirt from filter and from around filter area

JOB SHEET # 2

C. Remove drain plug (if provided) from base of filter (Figure 2) and catch oil in jar.

FIGURE 2



(Note: Removal of the plug drains out much of the dirt ahead of removing the filter element. Some filters are not equipped with drain plugs; draining action is secured when the bowl or filter body is removed.)

D. Loosen filter bowl or cover and remove

E. Remove old filter cartridge and discard it

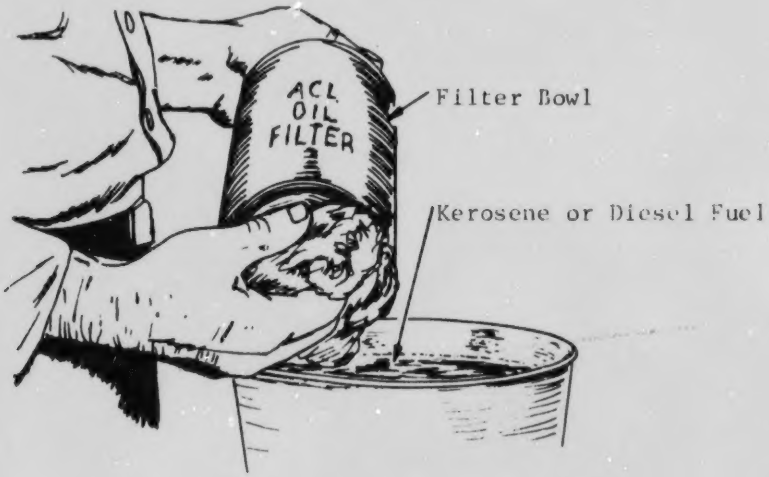
(Note: Do not try to clean the old filter element (unless it is the old style screen type). Abrasives embedded in filter material are difficult or impossible to remove.)

JOB SHEET #2

F. Clean inside of filter bowl and base with kerosene or diesel fuel (Figure 3)

(NOTE: This is to remove dirt deposits. Use a clean cloth and clean solvent solution.)

FIGURE 3



G. Replace and tighten drain plug (if one was removed)

H. Install new gasket, if supplied with filter

(NOTE: New gaskets are usually supplied with new filters. However, if a new gasket is not available, examine the old one. If may still be usable. With a "spin-on" type of filter you can reduce the chance of damaging the gasket by first applying a slight amount of crankcase oil or grease to the gasket before the filter is screwed into position.)

I. Install new filter unit

(NOTE: If your replacement cartridge is the type that is installed in a filter bowl, rotate the element slightly to help it become sealed. Do not apply much pressure because the seals can be easily damaged. If you have a spin-on filter that uses a rubber gasket, turn the filter on until the gasket contacts the base, then tighten no more than one-half turn. This keeps from over tightening which distorts the gasket and causes leaks.)

J. Replace filter bowl (if of that type) and tighten in place

(NOTE: Tighten just enough to form a seal. Too much tightening damages the gasket(s).)

JOB SHEET #2

K. Operate engine and check for leakage around filter

(NOTE: This is important. A small leak can cause enough oil loss to damage your engine.)

L. Check oil level and add oil if needed

(NOTE: Most filter elements require about one additional quart to recharge them. However some require more, even as much as three quarts.)

SERVICING THE TRACTOR--LUBRICATION SYSTEM
UNIT VII

TEST

1. Match the terms on the right to the proper definition.

_____a. A measure of the ability of an oil to flow

_____b. A cover on the bottom of the engine providing a reservoir for the engine oil

_____c. American Petroleum Institute

_____d. Society of Automotive Engineers

_____e. The resistance to movement between any two objects placed in contact with each other

_____f. A device used to strain the engine oil thus removing abrasive particles

_____g. American Society for Testing Materials

_____h. Specifications prepared by the Ordinance Department of the U.S. Army, Navy, and Air Force

1. Friction
2. Viscosity
3. API
4. SAE
5. Oil pan
6. Oil filter
7. MIL
8. ASTM

2. Name three purposes of the lubrication system

a.

b.

c.

3. Select from the list below the conditions that affect crankcase oil change intervals. Place an "X" by the correct conditions.

_____a. Kind of fuel used

_____b. Dirt conditions under which the tractor operates

_____c. Oil capacity in relation to the size and horsepower of the engine

_____d. Price of oil and filter

_____e. Load temperature under which the tractor operates

_____f. Skill of operator

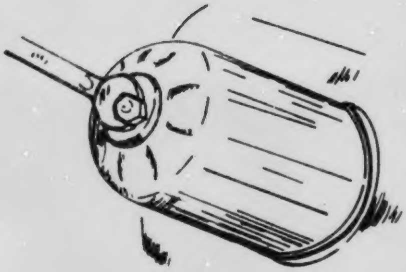
4. Identify three types of filter assemblies by matching the assemblies below with the proper illustration

_____a. Filter bowl held in position with a through bolt

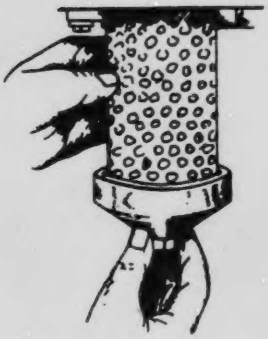
_____b. "Spin-on" double filter with outer shell

_____c. Filter cartridge held in place with cap and through bolt

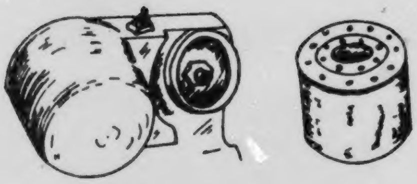
1.



2.



3.



5. Match the SAE letter designation on the right to the proper API and ASTM description.

a.______	MODERATE DUTY DIESEL ENGINE SERVICE Service typical of diesel engines operated in mild to moderate duty, but with lower quality fuels which necessitate more protection from wear and deposits. Occasionally has included gasoline engines in mild service. Oils designed for this service were introduced in 1949. Such oils provide necessary protection from bearing corrosion and from high temperature deposits in normally aspirated diesel engines with higher sulfur fuels.	Oil for use in gasoline and naturally aspirated diesel engines. Includes MIL-L-2104A oils where the diesel engine test was run using high sulfur fuel.
b.______	UTILITY GASOLINE & DIESEL ENGINE SERVICE Service typical of engines operated under such mild conditions that the protection afforded by compounded oils is not required. This classification has no performance requirements.	Oil without additive except that it may contain pour and/or foam depressants.
c.______	MINIMUM DUTY GASOLINE ENGINE SERVICE Service typical of engines operated under such mild conditions that only minimum protection afforded by compounding is desired. Oils designed for this service have been used since the 1930's and provide only anti-scuff capability, and resistance to oil oxidation and bearing corrosion.	Provides some anti-oxidant and anti-scuff capabilities.
d.______	SEVERE DUTY DIESEL ENGINE SERVICE Service typical of supercharged diesel engines in high-speed, high-output duty requiring highly effective control of wear and deposits. Oils designed for this service were introduced in 1955, and provide protection from bearing corrosion and from high temperature deposits in supercharged diesel engines when using fuels of a wide quality range.	Oil meeting the requirements of the Caterpillar Tractor Co. Series 3 specification. Provides moderately supercharged diesel engine performance. The Series 3 specification was established by Caterpillar in 1955. The related MIL-L-45199B specification was issued in 1968.
e.______	LIGHT DUTY DIESEL ENGINE SERVICE Service typical of diesel engines operated in mild to moderate duty with high quality fuels. Occasionally has included gasoline engines in mild service. Oils designed for this service were widely used in the late 1940's and 1950's. These oils provide protection from bearing corrosion and from high temperature deposits in normally aspirated diesel engines when using fuels of such quality that they impose no unusual requirements for wear and deposit protection.	Oil meeting the requirements of MIL-L-2104A. For use in gasoline and naturally aspirated diesel engines operated on low sulphur fuel. The MIL-L-2104A Specification was issued in 1954.
f.______	1968 GASOLINE ENGINE WARRANTY SERVICE Service typical of gasoline engines in passenger cars and trucks beginning with 1968 models and operating under engine manufacturers' warranties. Oils designed for this service provide more protection from high and low temperature engine deposits, wear, rust and corrosion in gasoline engines than oils for API Service Classification SC and may be used when oils for API Service Classification SC are recommended.	Oil meeting the requirements of the automobile manufacturers since 1968. Intended primarily for use in passenger cars. Provides low temperature anti-sludge and anti-rust performance.
g.______	1964 GASOLINE ENGINE WARRANTY SERVICE Service typical of gasoline engines in 1964 through 1967 models of passenger cars and trucks operating under engine manufacturers' warranties in effect during those model years. Oils designed for this service provide control of high and low temperature deposits, wear, rust and corrosion in gasoline engines.	Oil meeting the 1964-1967 requirements of the automobile manufacturers. Intended primarily for use in passenger cars. Provides low temperature anti-sludge and anti-rust performance.
h.______	MODERATE DUTY DIESEL & GASOLINE ENGINE SERVICE Service typical of lightly supercharged diesel engines operated in moderate to severe duty and has included certain heavy-duty, gasoline engines. Oils designed for this service were introduced in 1961 and used in many trucks and in industrial and construction equipment and farm tractors. These oils provide protection from high temperature deposits in lightly supercharged diesels and also from rust, corrosion and low temperature deposits in gasoline engines.	Oil meeting requirements of MIL-L-2104B. Provides low temperature anti-sludge, anti-rust and lightly supercharged diesel engine performance. The MIL-L-2104B specification was issued in 1964.
i.______	1972 GAS ENGINE WARRANTY MAINTENANCE SERVICE Service typical of gasoline engines in passenger cars and some trucks beginning with 1972 and certain 1971 models operating under engine manufacturers' warranties. Oils designed for this service provide more protection against oil oxidation, high temperature engine deposits, rust and corrosion in gasoline engines than oils which are satisfactory for API Engine Service SD or SC and may be used when either of these classifications is recommended.	Oil meeting the 1972 requirements of the automobile manufacturers. Intended primarily for use in passenger cars. Provides high temperature anti-oxidation, low temperature anti-sludge and anti-rust performance.

1. CA
2. CB
3. CC
4. CD
5. SA
6. SB
7. SC
8. SD
9. SE

6. Select from the list below the general rules to use when selecting your engine oil. Place an "X" by the proper rules.

_____a. Use reputable brands of oil of the proper viscosity and service ratings as outlined in the operator's manual

_____b. Drain and change oil at the beginning of each winter, spring and summer season

_____c. Select only oils which have been performance tested

_____d. Oils carrying a simular MIL specification can not be mixed if obtained from different suppliers

7. List three steps to use in storing and handling engine oils.

a.

b.

c.

8. Demonstrate the ability to:

a. Change crankcase oil.

b. Replace the oil filter.

(NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

SERVICING THE TRACTOR--LUBRICATION SYSTEM
UNIT VII

ANSWERS TO TEST

1. a. 2

   b. 5

   c. 3

   d. 4

   e. 1

   f. 6

   g. 8

   h. 7

2. Any three of the following:

   a. Lubricates moving parts to minimize power loss from friction

   b. Acts as a cooling agent to remove heat from engine parts

   c. Forms a seal between piston rings and cylinder walls

   d. Acts as a cleaning agent

   e. Absorbs shock between bearings and other parts

3. a

   b

   c

   e

4. a. 1

   b. 3

   c. 2

5. a. 2

   b. 5

c. 6

d. 4

e. 1

f. 8

g. 7

h. 3

i. 9

6. a

c

7. Any three of the following:

a. Store oil whenever possible in clean, closed cabinets or rooms

b. If stored outside, lay oil barrels on their sides; if they cannot be laid on their sides, tilt them slightly

c. Keep oil bungs drawn tight

d. Rinse oil containers and funnels in solvent after use

e. When adding oil, clean all dirt from around the filler cap before removing it

8. Performance skills will be evaluated to the satisfaction of the instructor.

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

TERMINAL OBJECTIVES

After completion of Unit VIII, the student should be able to match the fuel system components with the proper purpose and match the types of fuel filters and sediment bowls to the correct drawing of each. He should be able to clean the sediment bowl and fuel filter, change the diesel fuel filter, bleed fuel lines on diesel engines, and remove water and sediment from diesel fuel. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After the completion of this unit, the student should be able to:

1. Explain in writing the purpose of the fuel system.
2. Match the fuel system component with the proper definition.
3. Match the types of fuel filters and sediment bowls to the correct drawing of each.
4. Discuss in writing how often the sediment bowl and fuel filter should be cleaned.
5. Demonstrate the ability to:
    a. Clean the sediment bowl and fuel filter
    b. Change the diesel fuel filter
    c. Bleed fuel lines on diesel engines
    d. Remove water and sediment from diesel fuel

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Discuss terminal and specific objectives
4. Discuss information sheet
5. Demonstrate and discuss procedures outlined in the job sheets
6. Give test

Students:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Job sheets
    - #1--Clean the Sediment Bowl and Fuel Filter
    - #2--Change the Diesel Fuel Filter
    - #3--Bleed Fuel Lines on Diesel Engines
    - #4--Remove Water and Sediment from Diesel Fuel
4. Test
5. Answers to test

References:

1. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Maintenance. Athens, Georgia: Foote and Davis (Division of McCall Printing Co.), 1970.

2. American Association for Agricultural Engineering and Vocational Agriculture. Tractor Operation and Daily Care. Athens, Georgia: Foote and Davis (Division of McCall Printing), 1970.

SERVICING THE FARM TRACTOR--FUEL SYSTEM
UNIT VIII

INFORMATION SHEET

1. Purpose of the fuel system--To supply a combustible mixture of air and fuel to the engine cylinders

11. Components of the fuel system

    A. Fuel tank--A reservoir to store fuel for engine use

    B. Sediment bowl and filter--Allows water to settle out and catches particles of scale, rust, or foreign matter that will clog a carburetor

    C. Fuel pump--Pumps fuel from the tank to the carburetor

    D. Carburetor—A device for automatically mixing fuel and air in the proper proportion for a combustible mixture

    E. Fuel lines--Used to carry fuel from the fuel tank to the carburetor

    F. Air-cleaner--Used to filter grit and dust from the air entering the carburetor

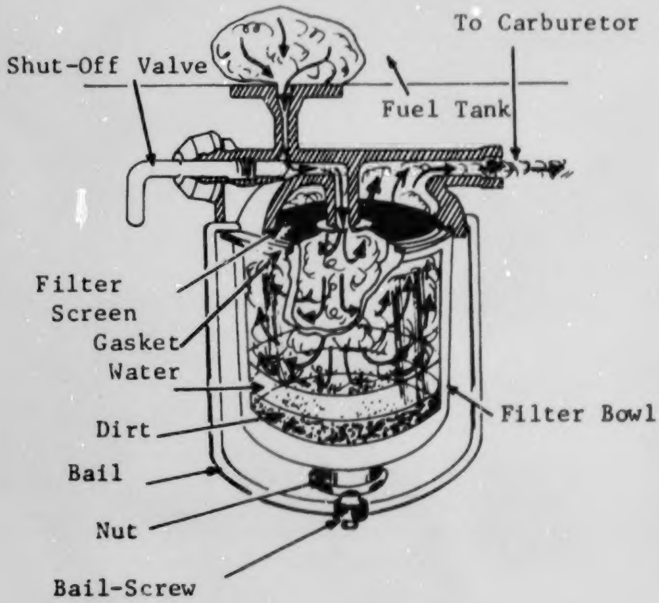
    G. Diesel injection-pump--Applies high pressure to the fuel (1600 to 3200 psi) which is used by the injector nozzles to make a fine mist of the fuel as it is sprayed into the cylinder

    (NOTE: Each cylinder has a separate injection pump, in some models.)

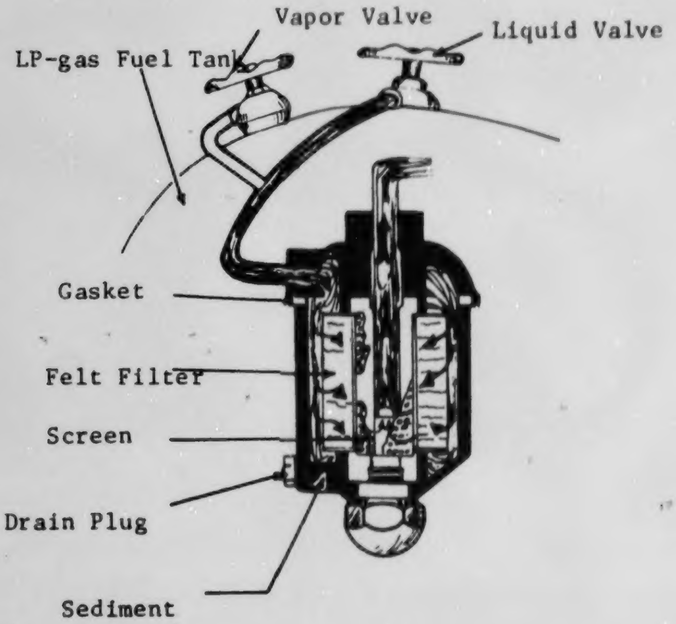
INFORMATION SHEET

III. Types of fuel filters and sediment bowls

A. Glass bowl with screen fiber commonly used on gasoline and diesel tractors

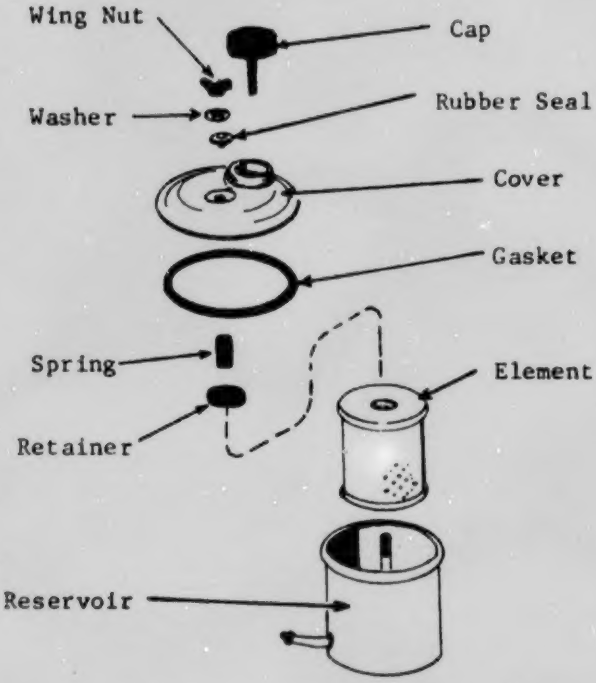

To Carburetor
Shut-Off Valve
Fuel Tank
Filter
Screen
Gasket
Water
Filter Bowl
Dirt
Bail
Nut
Bail-Screw

B. Metal bowl with felt filter and screen often used on LP-gas tractors

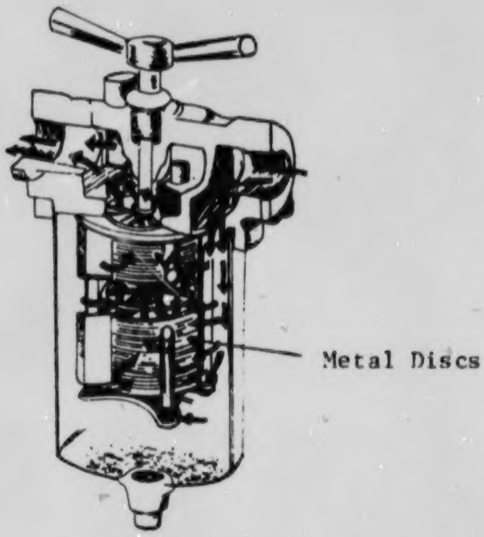

Vapor Valve
Liquid Valve
LP-gas Fuel Tank
Gasket
Felt Filter
Screen
Drain Plug
Sediment

INFORMATION SHEET

C. Diesel fuel filter used on diesel tractors


Wing Nut
Cap
Washer
Rubber Seal
Cover
Gasket
Spring
Element
Retainer
Reservoir

D. Edge-type (disc) filter sometimes used with either liquid or gas fuels


Metal Discs

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

JOB SHEET #1--CLEAN THE SEDIMENT BOWL AND FUEL FILTER

1. Tools and materials needed

    A. Set of open end wrenches

    B. Container with solvent (kerosene or diesel fuel)

    C. New gasket(s)

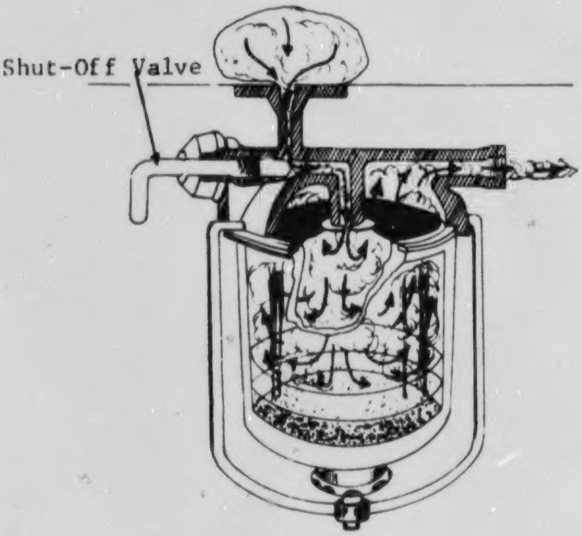
    D. Air under pressure

11. Procedure

    A. Close valve or valves on fuel supply line

    (Note: For liquid fuel tractors the shut-off valve is frequently a part of the filter assembly. (Figure 1) With LP-Gas be sure both the liquid and vapor valves are closed.) (Figure 2)

FIGURE 1



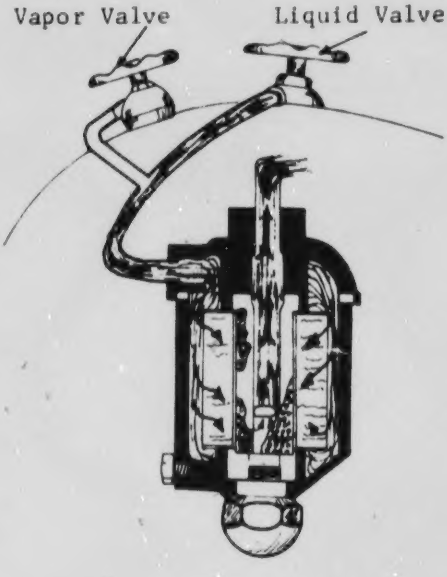


FIGURE 2

JOB SHEET #1

B. Loosen the nut that holds the sediment bowl in place

(Note: Sediment bowls on most liquid-fuel tractors are held in place with a jam nut. (Figure 3) Sediment bowls for LP-Gas tractors may be held with a stud nut (Figure 4) or may be threaded to the filter base. (Figure 5)

FIGURE 3

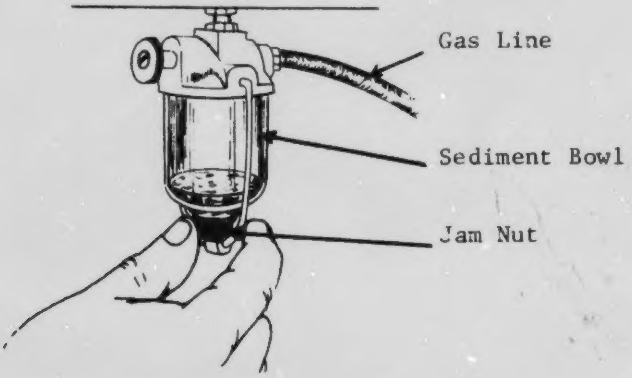
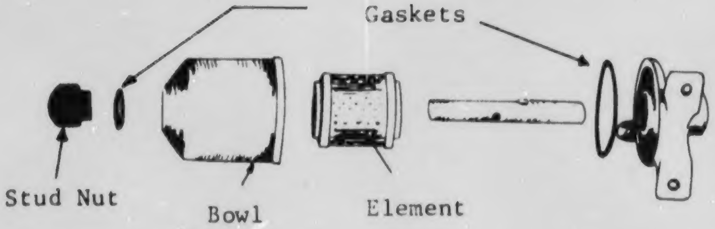

Gas Line
Sediment Bowl
Jam Nut

FIGURE 4


Gaskets
Stud Nut
Bowl
Element

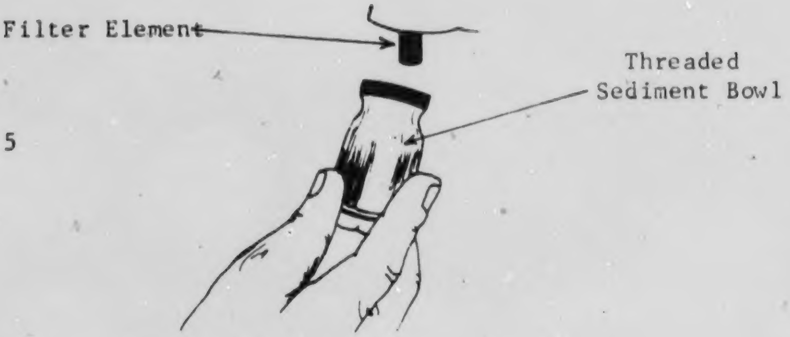

Filter Element
Threaded Sediment Bowl

FIGURE 5

JOB SHEET #1

C. Remove Bowl with twisting motion

(Note: There is less danger of breaking the gasket if the glass bowl is twisted while being removed.)

D. Remove gasket

(Note: If the gasket is cracked or hard, be sure to replace with a new gasket. If you do not have a new gasket and the old one is still in good shape, note which side is next to the bowl, then turn it over so the opposite side will contact the bowl when you put it back in place.)

E. Remove strainer screen or filter

(Note: The screen is easily removed from the top of the sediment bowl since it is held in place by the clamping action between the bowl and gasket. If a filter is used in place of a screen, it will lift out easily or may be of the type to be unscrewed from the base of the assembly. (Figure 6) If the filter is of the edge type (Figure 7), avoid rubbing the accumulated sediment into the filter unit. This tends to embed the material in the small openings and makes it difficult to remove.)

FIGURE 6

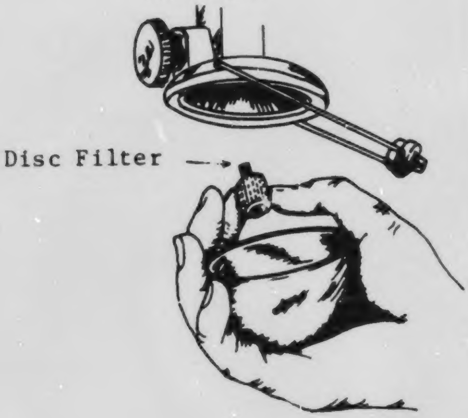
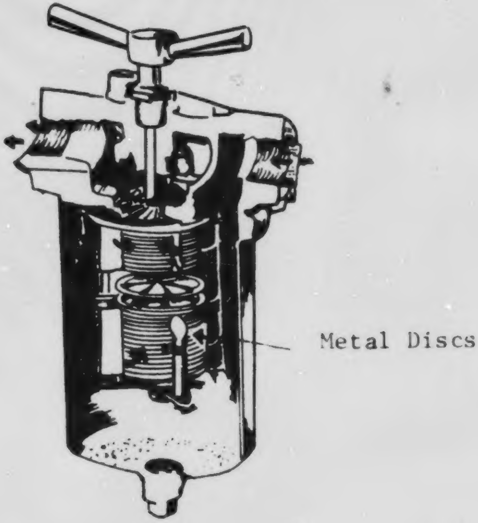


FIGURE 7



JOB SHEET # 1

F. Wash screen or filter element

(Note: If the filter element is a disposable type (Figure 8), it should be replaced with a new one. Wash the screen type in diesel fuel or kerosene. (Figure 9) Some disc-type filters have screws on the end which will loosen the discs when unscrewed. If the screen or disc filter is difficult to clean, it may be because of gum and varnish residues that have collected. These are not soluble in diesel fuel or kerosene. Use a paint remover, varnish solvent, acetone, or a mixture of one part alcohol and one part benzol. If a disc-type filter is to be re-installed in an LP-Gas tractor, finish drying the filter element by blowing air through one end. (Figure 10)

FIGURE 8

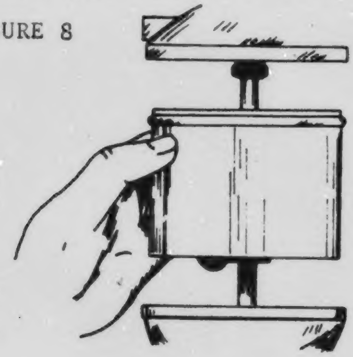
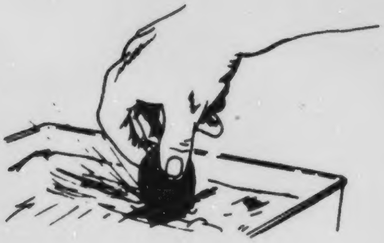
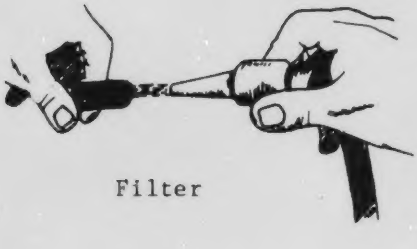


FIGURE 9



Filter Screen

FIGURE 10



Filter

G. Clean sidement bowl

(Note: Use some of the cleaning solution on a cloth, then wipe dry enough that no lint is left in the bowl.)

H. Open fuel valve and observe flow of fuel (This does not apply to LP-Gas tractors.)

(NOTE: This tends to remove any dirt between the tank and the sediment bowl. It also serves as a check on the condition of the vent hole in the fuel-tank cap. If the vent hole is clogged, the flow will be slow. (Figure 11) Remove the tank cap and open the vent hole with cleaning solvent. (Figure 12) Be sure to catch fuel that is wasted from the fuel line; careless handling causes a serious fire hazard.)

FIGURE 11

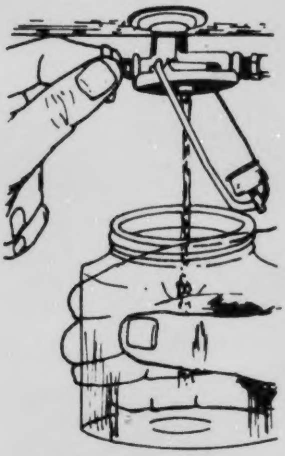
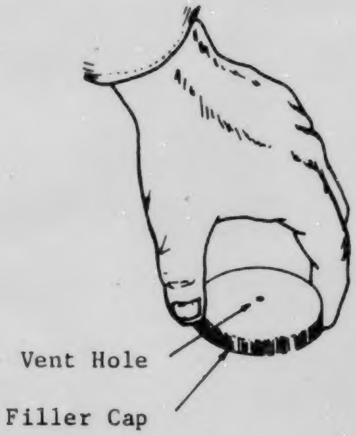


FIGURE 12



I. Re-install gasket, strainer (or filter), and sediment bowl

(NOTE: If a disc-filter element, tighten it with fingers. If tightened too much, the disc will warp and restrict the flow of fuel.)

J. Tighten bowl against gasket

(NOTE: Tighten completely for spark-ignition engines. For diesel engines, it may need to be installed loosely until air has been bled from the system; then tighten. Refer to Job Sheet #3 for bleeding diesel lines.)

K. Open the fuel valve, start your tractor, and check for leaks

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

JOB SHEET #2--CHANGE THE DIESEL FUEL FILTER

I. Tools and materials needed

- A. Clean rags
- B. Container with solvent (kerosene or diesel fuel)
- C. Container to catch waste diesel fuel
- D. Set of open end wrenches
- E. Small scrub brush
- F. Replaceable filters, if needed

II. Procedures

A. Turn off fuel supply at tank

B. Clean outside of filter body and engine area around filter; wipe dry

(NOTE: This is important to keep dirt from entering fuel system. Use a cloth and diesel fuel to remove dirt, then wipe the cleaned area dry with a clean cloth.)

C. Drain fuel from filter

(NOTE: Most filters have a drain cock at the base or plug. Catch the fuel in a pan.)

D. Remove old filter

E. Clean inside of filter bowl (unless it is a self-contained type)

(NOTE: If cloth is used, be sure it is lint free and clean. Some manufacturers recommend the use of a brush.)

F. Reinstall cleaned filter or new disposable filter element

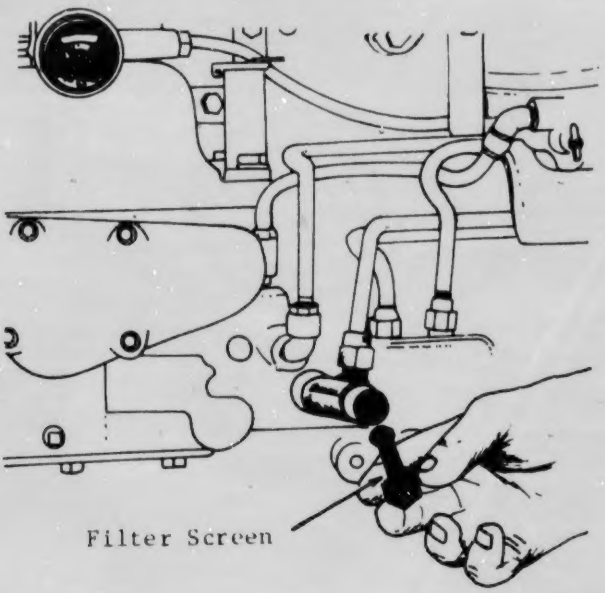
G. Complete the filter assembly and tighten it

JOB SHEET #2

H. Replace the drain plug or tighten the drain valve

(NOTE: Some tractors are equipped with a screen on the low pressure side near the primary pump. (Figure 1) If tractor is equipped with one of these, you may clean the screen when you service the filter element.)

FIGURE 1



SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

JOB SHEET #3--BLEED FUEL LINES ON DIESEL ENGINE

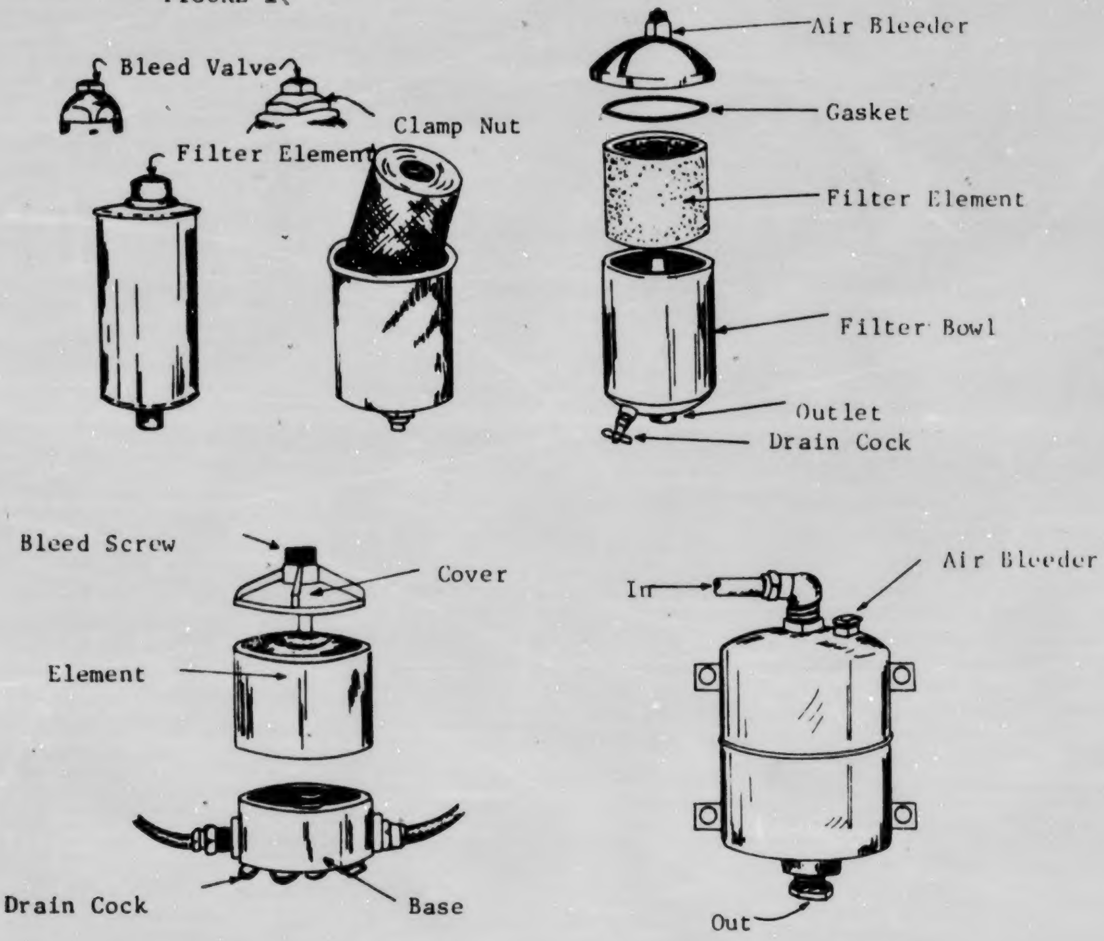
(NOTE: Each time the filters are drained and new filter elements installed, considerable air is left in the filter body and fuel line, it may form an air lock when you try to start the engine. It is important to remove the air before you attempt to start the engine. Procedures are the same for the first, second, or third stage filters except noted under each step. If more than one filter has been changed, bleed the one closest to the tank first. Remember, always follow manufacturer's recommendations.)

I. Materials needed--Set of open end wrenches

II. Procedure

A. Open bleed valve on top of filter (Figure 1)

FIGURE 1

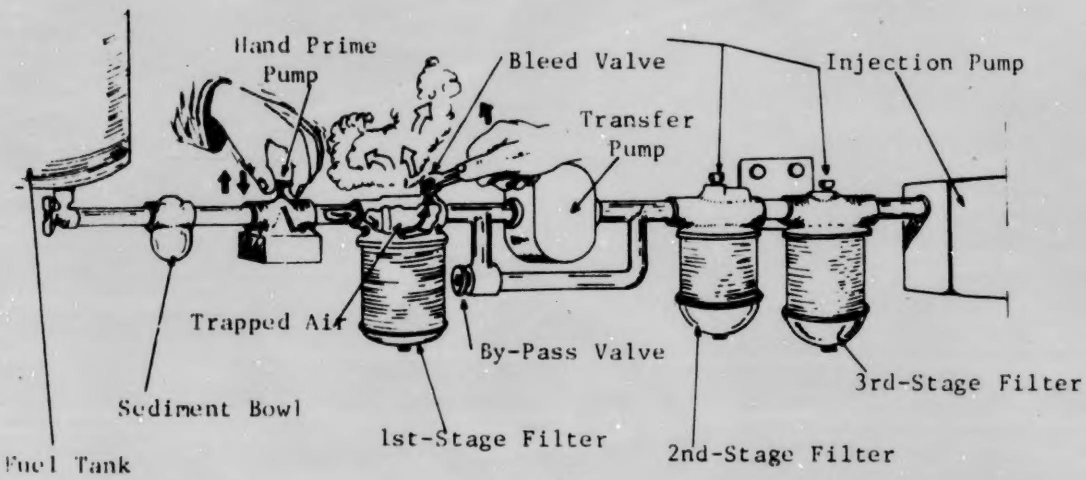

Bleed Valve
Clamp Nut
Filter Element
Air Bleeder
Gasket
Filter Element
Filter Bowl
Outlet
Drain Cock
Bleed Screw
Cover
Element
Drain Cock
Base
In
Air Bleeder
Out

JOB SHEET #3

B. Open fuel tank valve

(NOTE: This will force the air out through the bleed valve and replace the air space with fuel. Some tractors are equipped with a hand-prime pump to be used in removing air. (Figure 2) Several strokes of the hand pump quickly removes the air and replaces it with fuel. If a transfer pump is located between the fuel tank and the filter you are bleeding, you will probably find a bypass line and valve. By opening the valve, fuel bypasses the pump so air can be bled out of the filter. (Figure 2)

FIGURE 2


Hand Prime Pump
Bleed Valve
Injection Pump
Transfer Pump
Trapped Air
By-Pass Valve
3rd-Stage Filter
Sediment Bowl
1st-Stage Filter
2nd-Stage Filter
Fuel Tank

C. Close bleed valve

(NOTE: Do this to avoid damaging seal. Do not overtighten.)

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

JOB SHEET #4--REMOVE WATER AND SEDIMENT FROM DIESEL FUEL

I. Materials and tools

A. Clean rags

B. Container to catch waste diesel fuel

II. Procedure

(NOTE: Use the directions in your operators manual for the make and type of your tractor. If you haven't a manual, use the following procedures.)

A. Check for drain cock on

1. Bottom of fuel tank (Figure 1)
2. Bottom of first filter (Figure 2)
3. Top of sediment bowl

FIGURE 1

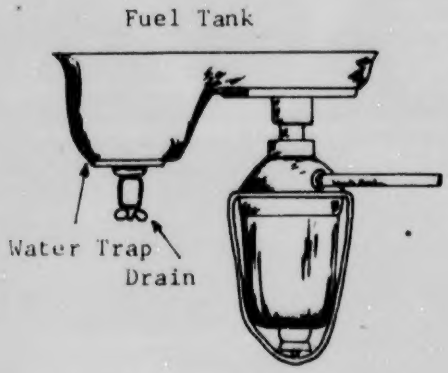
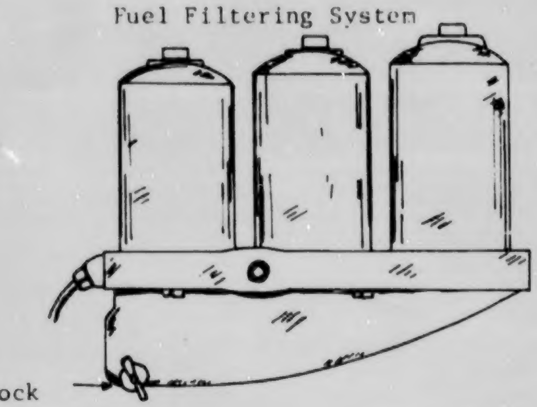


FIGURE 2



B. If equipped with drain cock

1. Open and drain about one pint of fuel

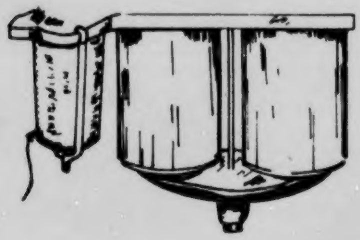
   (NOTE: This is done to make certain water and sediment are removed.)

2. Close drain cock

JOB SHEET #4

C. If equipped with water trap and sediment bowl (Figure 3) and if sediment bowl is more than one-third full of water, proceed as follows:

FIGURE 3



Water Trap and Sediment Bowl

1. Close fuel valve under fuel tank
2. Loosen thumb nut under bowl and swing bail to one side
3. Remove glass bowl, empty, and clean

   (NOTE: Be careful not to lose the gasket the filter bowl presses against. When bowl is removed, the gasket may be on top of bowl or may remain in top of filter assembly.)

4. Wash glass bowl in kerosene to remove dirt and sediment
5. Install bowl loosely

   (NOTE: When installing bowl, be sure to check the gasket. If it is not in good shape, replace the gasket with a new one.)

6. Open fuel valve and allow bowl to fill

   (NOTE: With bowl mounted loosely, the fuel forces air out of top of bowl.)

7. Tighten thumb nut under bowl when air is completely removed

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

TEST

1. Explain in writing the purpose of the fuel system.

2. Match the fuel system components on the right with the proper definition

_____a. Used to filter grit and dust from the air entering the carburetor

_____b. A device for automatically mixing fuel and air in the proper proportion for a combustible mixture

_____c. Used to carry fuel from the fuel tank to the carburetor

_____d. A reservoir to store fuel for engine use

_____f. Pumps fuel from the tank to the carburetor

_____g. Applies high pressure to the fuel (1600-3200 psi) which is used by the injector nozzles to make a fine mist of the fuel as it is sprayed into the cylinder

1. Fuel tank
2. Sediment bowl and filter
3. Fuel pump
4. Carburetor
5. Fuel lines
6. Diesel injection-pump
7. Air-cleaner

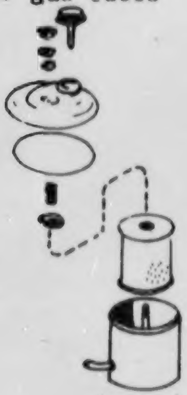
3. Match the fuel filters and sediment bowls listed below with the following drawings.

_____a. Glass bowl with screen fiber commonly used on gasoline and diesel tractors

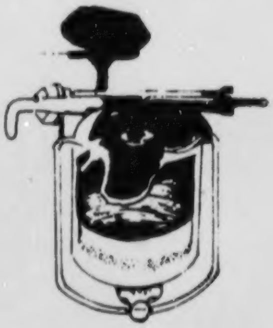
_____b. Metal bowl with felt filter and screen often used on LP-Gas tractors _____c. Diesel fuel filter used on diesel tractors

_____d. Edge-type (disc) filter sometimes used with either liquid or gas fuels

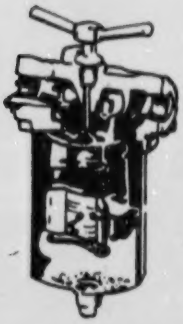
1.



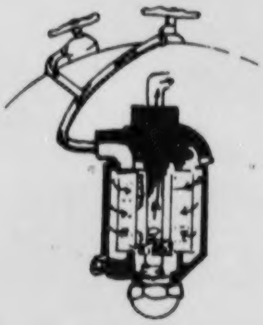
2.



3.



4.



4. Discuss in writing how often the sediment bowl and fuel filter should be cleaned.

5. Demonstrate the ability to:

   a. Clean the sediment bowl and fuel filter

   b. Change the diesel fuel filter.

   c. Bleed fuel lines on diesel engines

   d. Remove water and sediment from diesel fuel

   (Note: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.

SERVICING THE TRACTOR--FUEL SYSTEM
UNIT VIII

ANSWERS TO TEST

1. To supply a combustible mixture of air and fuel to the engine cylinders

2. a. 7

   b. 4

   c. 5

   d. 1

   e. 2

   f. 3

   g. 6

3. a. 2

   b. 4

   c. 1

   d. 3

4. Gasoline and diesel tractors should be serviced from ten to 900 hours. LP-Gas tractors service intervals vary from 100 hours to yearly.

5. Performance skills will be evaluated to the satisfaction of the instructor.

IGNITION SYSTEM
UNIT IX

TERMINAL OBJECTIVES

After completion of this unit, the student should be able to select from a list the components of the primary and secondary ignition circuits. He should be able to identify the components of a battery powered ignition system and components of a distributor. The student should be able to check the condition of a distributor, replace breaker points, and adjust breaker points. This knowledge will be evidenced through demonstration and by scoring eighty-five percent of the the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student shouls be able to:

1. Match terms associated with the ignition system to the proper definition.
2. Explain in writing the purpose of the ignition system.
3. Select from a list the components of the primary and secondary ifnition circuits.
4. Identify the components of a battery powered ignition system
5. Identify the components of a distributor.
6. List reasons why points may be badly burned.
7. Name 2 methods of timing an engine.
8. List 2 reasons why engine timing is important.
9. Name 3 indications of timing being too late.
10. Name 2 indications of timing being too early.
11. Demonstrate the ability to:
    a. Check the condition of the distributor
    b. Replace breaker points
    c. Adjust breaker points
    d. Time an engine by the breaker-point method
    e. Time an engine by the timing-light method

IGNITION SYSTEM
UNIT IX

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Student:

1. Read objectives
2 Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    TM 1--Primary Circuit
    TM 2--Secondary Circuit
    TM 3--Battery Powered Ignition System
    TM 4--Distributor Components
4. Job sheets
    #1--Check the Condition of the Distributor
    #2--Replace Breaker Points
    #3--Adjust Breaker Points
    #4--Timing an Engine by the Breaker-Point Method
    #5--Timing an Engine by the Timing-Light Method
5. Test
6. Answers to test

References:

1. Tractor Maintenance. American Association for Instructional Materials. Athens, Georgia: Foote and Davis (Division of McCall Printing Company), 1970.

2. Auto Mechanics Instructional Units. Curriculum and Instructional Materials Center, Stillwater, Oklahoma, 1971.

3. Fundamentals of Machine Operation-Preventive Maintenance. John Deere Service Publications (Deere and Company, Moline, Illinois) 1973.

IGNITION SYSTEM
UNIT IX

INFORMATION SHEET

I. Terms and definitions

  A. Battery--A source of electrical power

  B. Ignition switch--Opens and closes the primary circuit from battery to the contact points

  C. Resistance unit--Reduces voltage in the primary circuit to protect the contact points

  D. Ignition coil--Transforms low voltage into high voltage necessary to jump the spark plug gap

  E. Contact points--Make and break the primary circuit to allow the coil to produce high voltage at the spark plugs

  F. Condensor--Stores extra current as the contact points open to prevent arcing and burning

  G. Distributor--Contains the contact points and condensor; distributes the high voltage current from the coil to the proper cylinder

  H. Breaker cam--Opens and closes the contact points

  I. Spark-advance mechanisms--Regulate the timing of the high voltage circuit for the best ignition during all speed and load conditions

  J. Rotor--Takes the high voltage current from the coil and directs it to the correct cylinder

  K. Distributor cap--Holds the coil and spark plug wires in a sequence and provides a cover for the distributor

  L. Spark plug--Provides a spark gap inside the engine cylinder to ignite the fuel air mixture

  M. Primary ignition wire--Carries low voltage from the battery to the primary side of the ignition coil (light wire)

  N. Secondary ignition wire--Carries high voltage from the secondary side of the coil to the spark plug (heavily insulated wire)

II. Purpose of the ignition system--To produce high voltage current to ignite the fuel air mixture in the engine cylinders

III. Ignition system circuits

INFORMATION SHEET

A. Primary--Low voltage circuit (Transparency 1)

    1. Battery
    2. Ignition switch
    3. Resistance unit
    4. Primary winding of the coil
    5. Contact points
    6. Condensor
    7. Low voltage wire that connects the units

B. Secondary--High voltage circuit (Transparency 2)

    1. Secondary winding of the coil
    2 Distributor cap
    3. Rotor
    4. Spark plug
    5. High voltage wire that connects the units

IV. Parts of a battery-powered ignition system (Transparency 3)

    A. Ignition switch
    B. Battery
    C. Ignition coil
    D. Distributor
    E. Spark plugs
    F. Spark-plug wires

V. Distributor components (Transparency 4)

    A. Distributor cap
    B. Rotor
    C. Centrifugal advance mechanism

INFORMATION SHEET

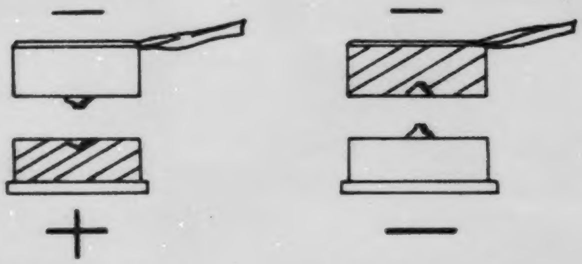
- D. Condensor
- E. Vacuum advance
- F. Breaker plate
- G. Distributor cam
- H. Contact points
- I. Distributor housing
- J. Primary lead wire
- K. Distributor drive gear
- L. Dust Caps

VI. Reasons for badly burned points

- A. Oil or foreign material on the contact surfaces
- B. A contact-point gap adjustment that is either too wide, too close, or points that are out of alignment.
- C. A defective condensor

(NOTE: If the condensor is not working properly or is not of the proper capacity for your ignition system, there will be a cone-shaped deposit of metal on one point and a cone-shaped pit on the other.)

Example:



Capacity Too High Capacity Too Low

Check tightness of screw that hold the condensor. This screw is also ground connection and must be tight.

VII. Methods of timing an engine

- A. The breaker-point method
- B. The timing-light method

INFORMATION SHEET

VIII. Importance of proper timing

- A. Increase horsepower
- B. Decrease fuel consumption

(NOTE: Ignition is set so the distributor will supply a spark to each cylinder at a time when the fuel will burn with greatest efficiency. This will supply the most economical power.)

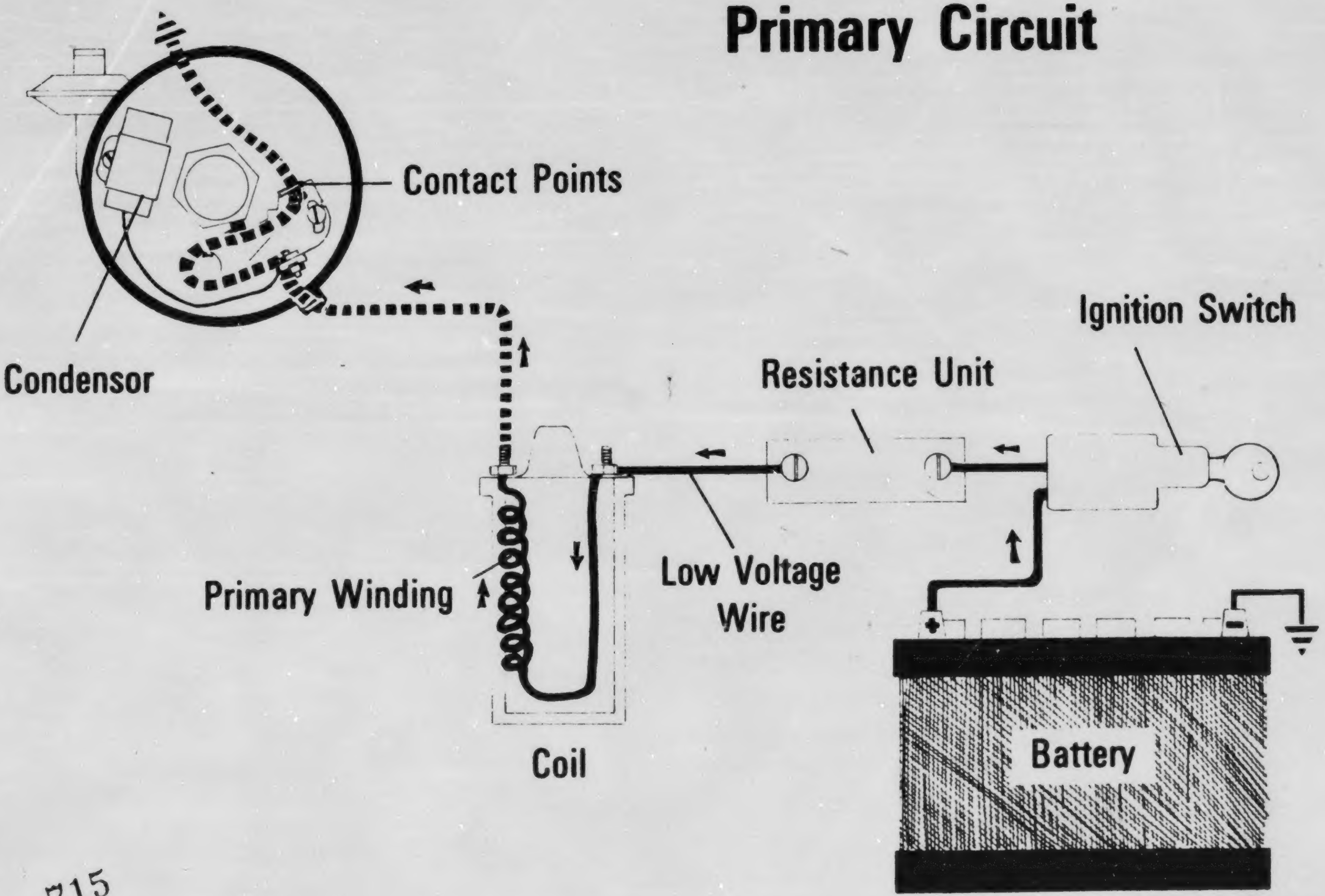
IX. Indications of timing too late

- A. Retarded spark causes late firing
- B. Exhaust gases escape while they are still quite hot
- C. Wastes power
- D. Increase in exhaust gas temperature
- E. Warped valves

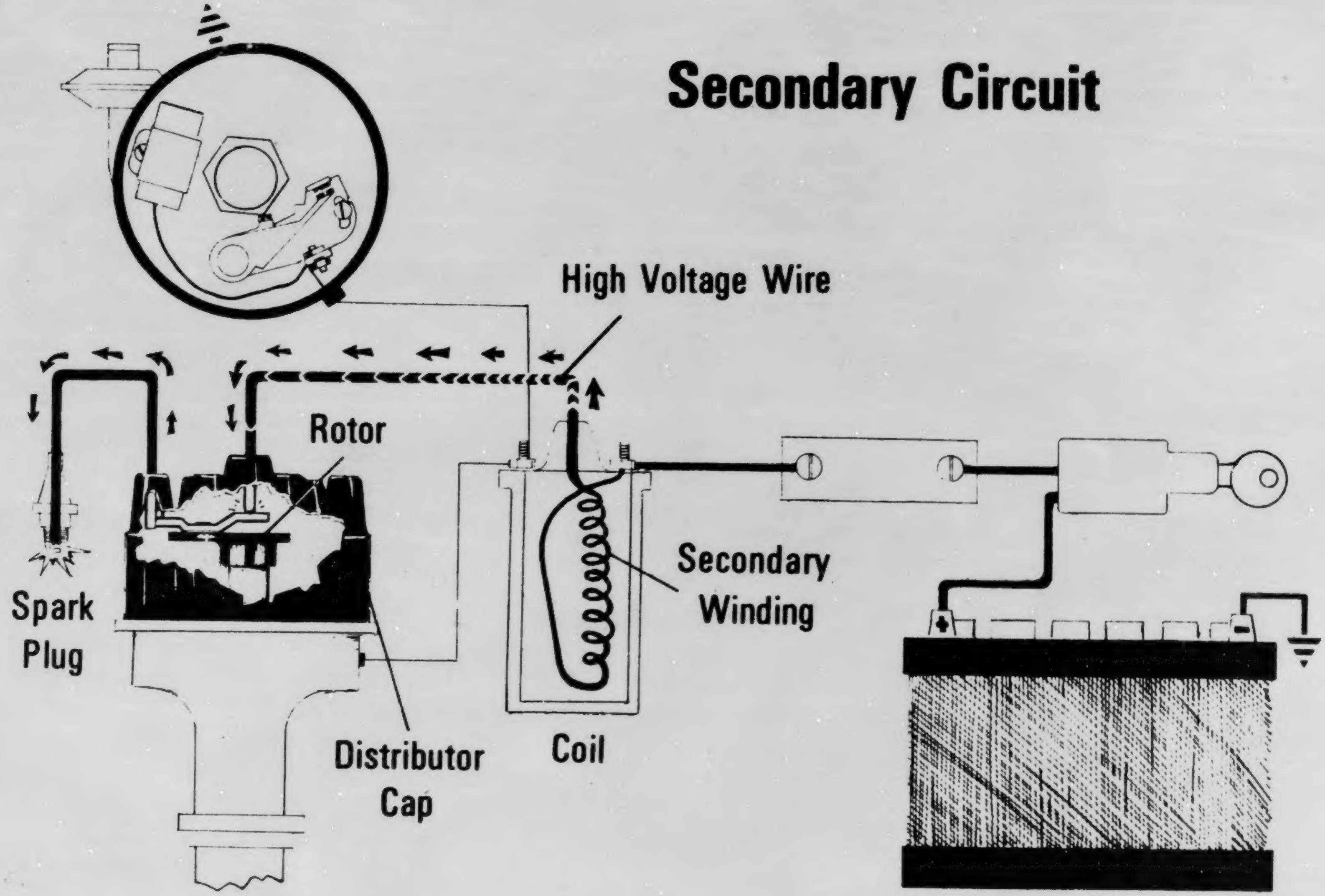
X. Indication of timing too early

- A. Engine may knock
- B. Increased temperature within the cylinder

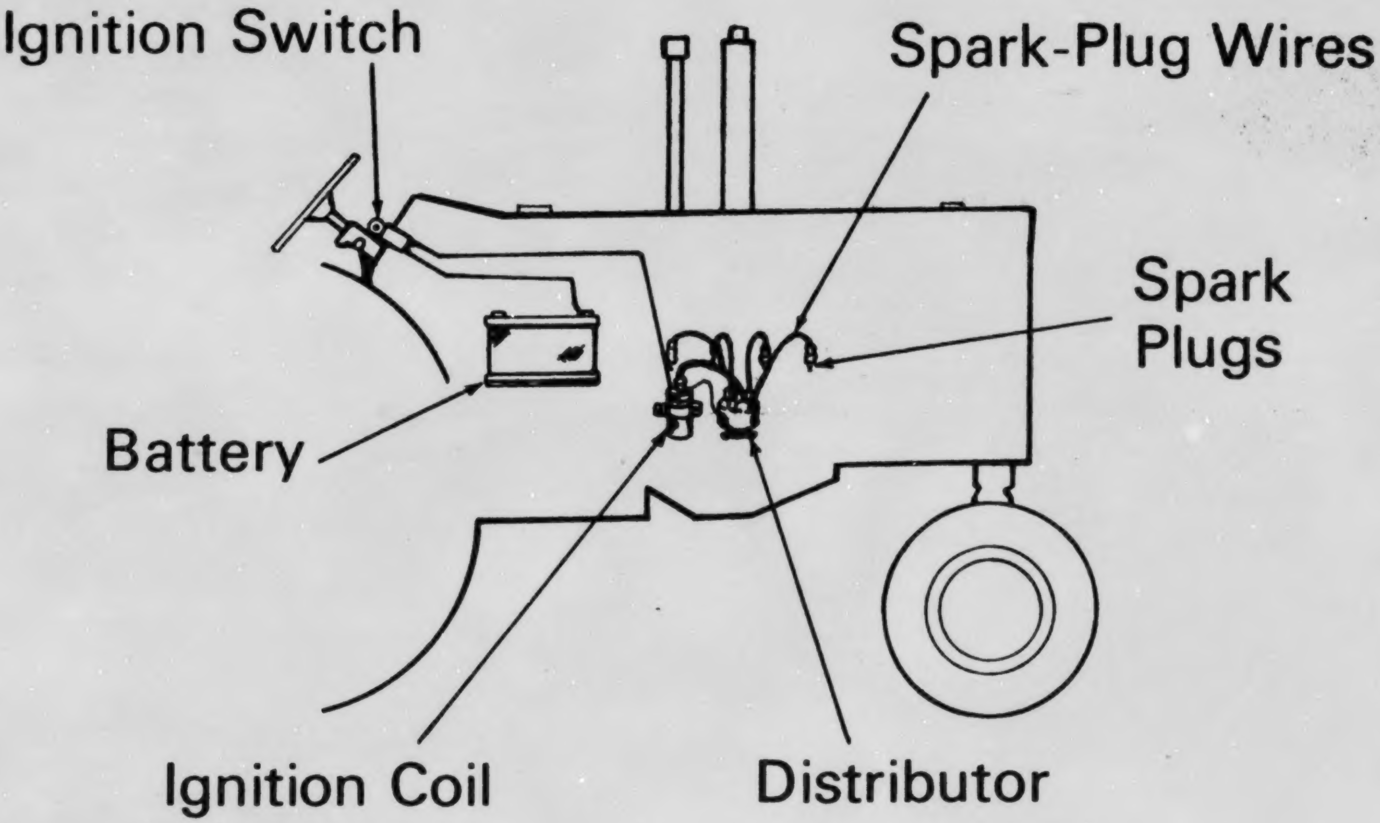
Primary Circuit


Contact Points
Condensor
Ignition Switch
Resistance Unit
Low Voltage Wire
Primary Winding
Coil
Battery
+
-

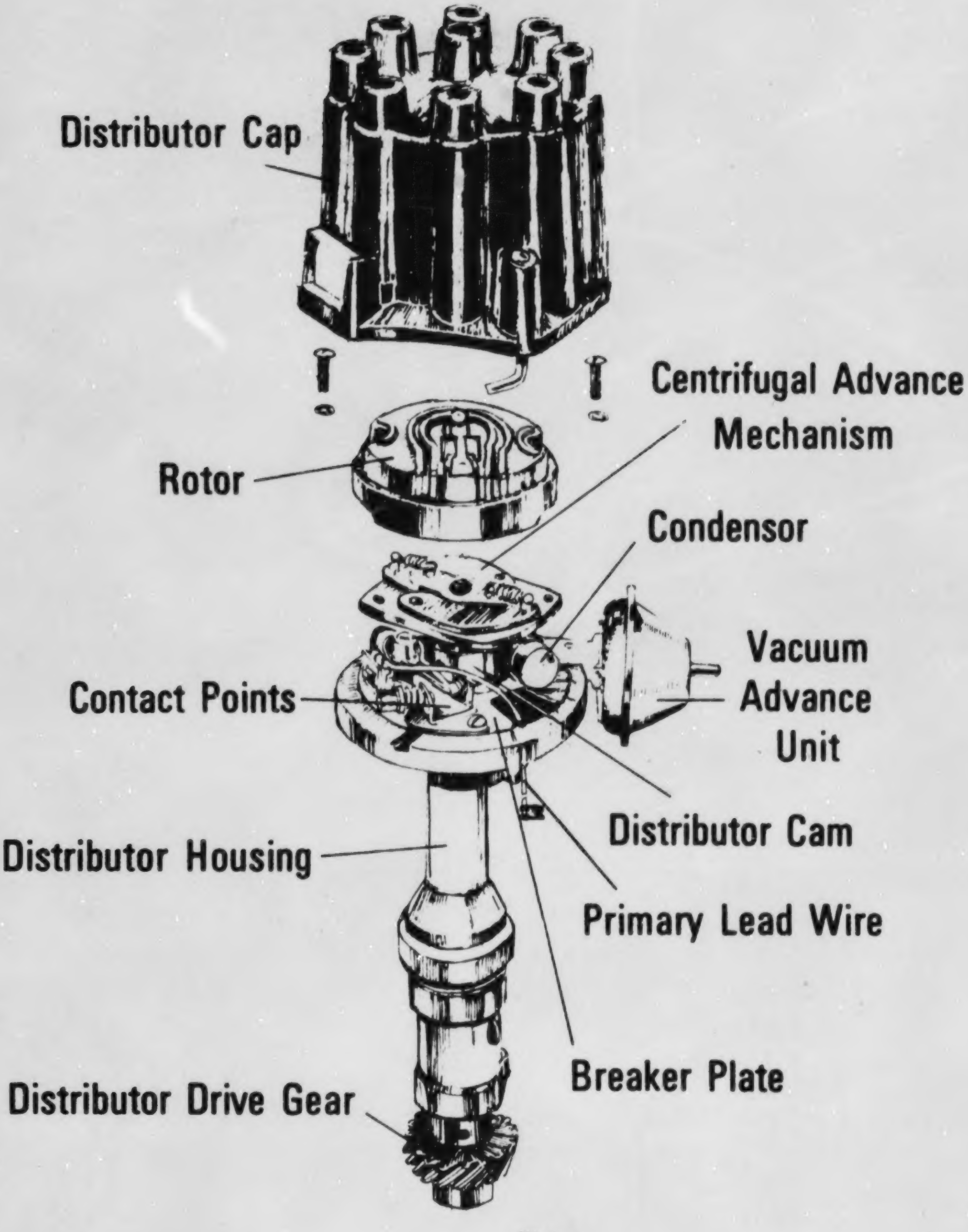
Secondary Circuit


High Voltage Wire
Rotor
Secondary Winding
Spark Plug
Distributor Cap
Coil

Battery Powered Ignition System


Ignition Switch
Spark-Plug Wires
Spark Plugs
Battery
Ignition Coil
Distributor

Distributor Components


Distributor Cap
Centrifugal Advance Mechanism
Rotor
Condensor
Vacuum Advance Unit
Contact Points
Distributor Cam
Distributor Housing
Primary Lead Wire
Breaker Plate
Distributor Drive Gear

IGNITION SYSTEM
UNIT IX

JOB SHEET #1--CHECK THE CONDITION OF THE DISTRIBUTOR

I. Tools and materials needed

A. Screwdriver

B. End wrenches

C. Ignition file

D. Clean rags

E. Small pan of kerosene or diesel fuel

II. Procedure

A. Remove dirt from outside surface of distributor and cap

(NOTE: Use a dry cloth or if necessary a small amount of diesel or kerosene. Do not use water, it may cause short circuiting.)

B. Remove cap and clean inner surfaces--Leave wires connected

(NOTE: Use a clean dry cloth to remove carbon, dust, moisture, or oil deposits.)

C. Check distributor cap for chips or cracks

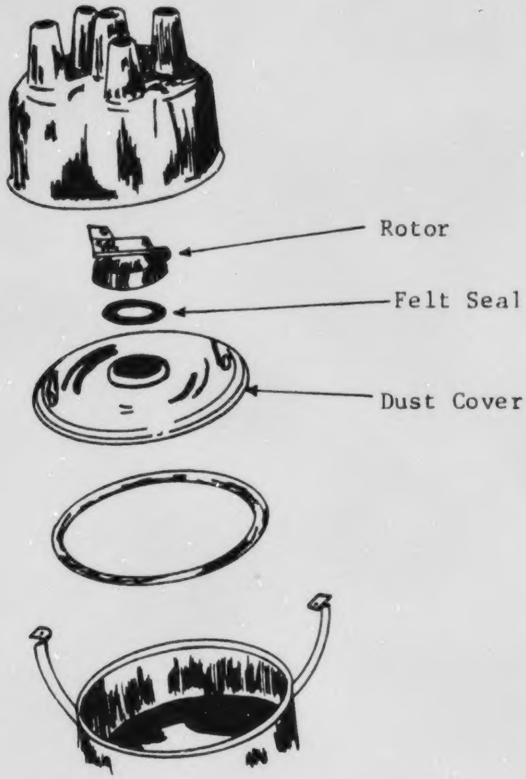
(NOTE: If cap is cracked, replace with a new one. Also check condition of carbon button in center of cap. If it shows excessive wear, chips, or cracks, get a new distributor cap.)

JOB SHEET #1

D. Remove distributor arm (rotor) and clean (Figure 1)

(NOTE: Pull the distributor arm or rotor straight up or out (if mounted horizonally) from the end of the shaft. Wipe the rotor arm clean with a dry cloth and inspect for cracks or excessive burning of the metal strip. If top of metal strip is badly burned, replace the old rotor with a new one.)

FIGURE 1



E. Remove dust cover, if one is used, and check condition of felt seal

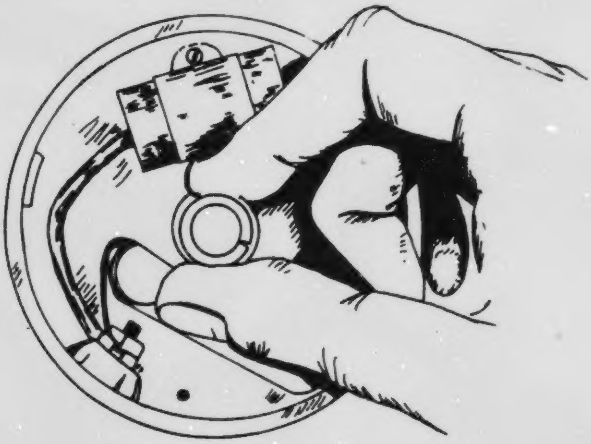
(NOTE: If seal is worn, dirt may enter the breaker compartment and cause rapid wear of the cam lobes.)

JOB SHEET #1

F. Check the centrifugal-advance mechanism (Figure 2)

(NOTE: Turn distributor shaft in direction of normal rotation. It should rotate freely for a short distance as the weights move outward. The springs should return it to the original position when released. If it does not work properly, have a service man check it.)

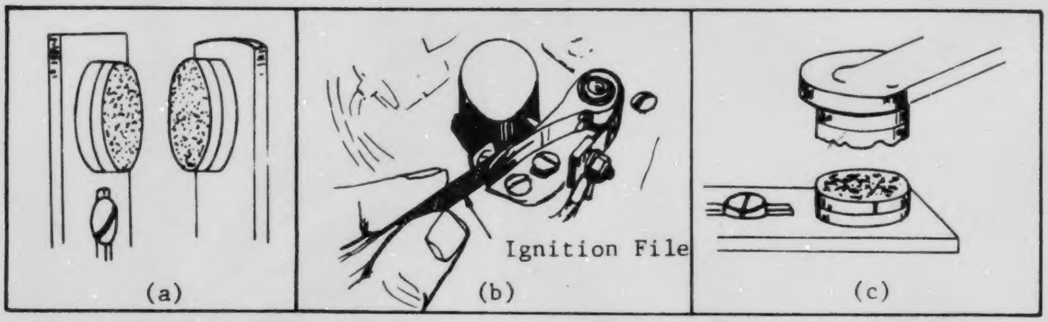
FIGURE 2



G. Check condition of breaker points

(NOTE: If the contact points are rough but show only slight pitting and metal deposits, smooth with an ignition file. The points do not need to be completely smooth with all pits removed. Blow out the dust after you have completed the filing. (Figure 3))

FIGURE 3



(a) Contact points that are slightly burned or pitted may be (b) smoothed with an ignition file. (c) Badly pitted points should be replaced with new ones.

Reassemble distributor in reverse order from the above listed steps.

IGNITION SYSTEM
UNIT IX

JOB SHEET #2--REPLACE BREAKER POINTS

I. Tools and materials needed

  A. Screwdriver

  B. Multi-purpose grease

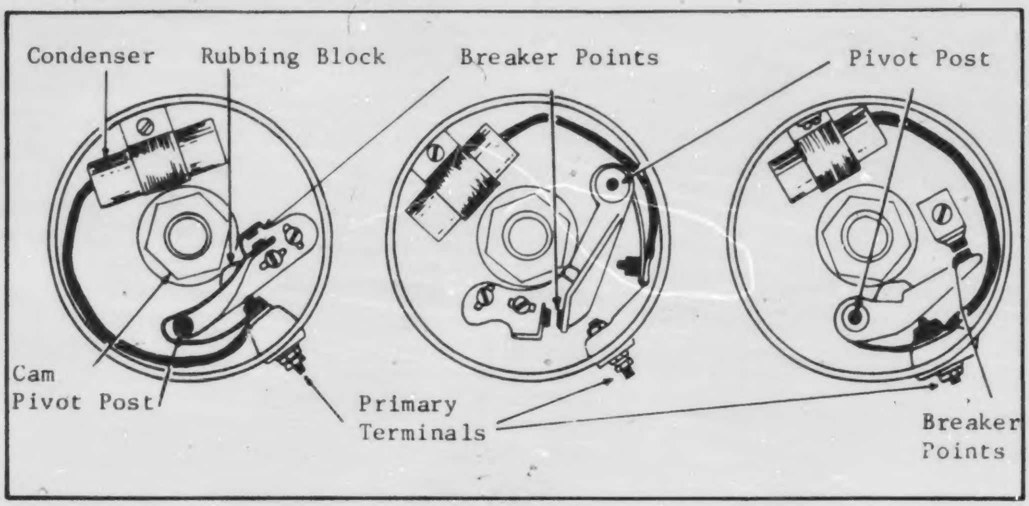
  C. Small amount of SAE-10 crankcase oil

  D. Clean rags

II. Procedure

  A. Remove breaker arm and spring (Figure 1)

FIGURE 1

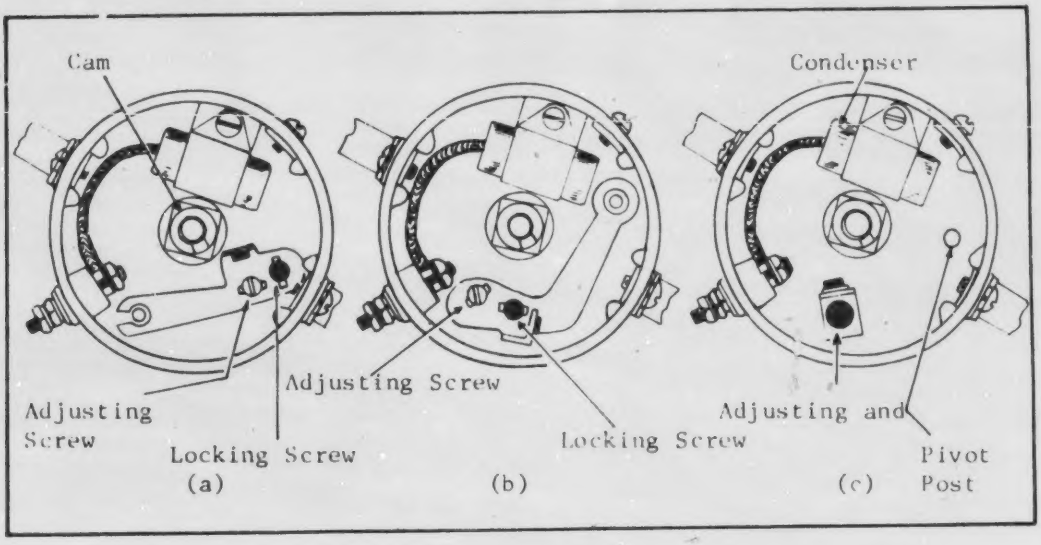

Condenser
Rubbing Block
Breaker Points
Pivot Post
Cam
Pivot Post
Primary Terminals
Breaker Points

JOB SHEET #2

B. Remove stationary breaker point and bracket (Figure 2)

(NOTE: On most distributors one end of the breaker-point bracket is held by the same pivot pin that held the breaker arm. The other end is sometimes held by a locking screw (Figure 2a and 2b). The second screw is for adjusting the position of the points and is called an "eccentric screw" or "adjusting screw". On others, the bracket and breaker point are held by one screw (Figure 2c). With this type the hole in the bracket is slotted so the breaker point can be adjusted to the proper position.)

FIGURE 2



C. Clean, then lubricate cam with petroleum jelly or multi-purpose grease

(NOTE: Use only enough for a thin film on the cam lobes. This avoids getting it on the breaker points, causing them to burn. A very small amount greatly reduces wear on the rubbing block and cam.)

D. Install new points in reverse order

(NOTE. Apply a drop of SAE-10 crankcase oil around the contact point pivot post before installing new points. (Figure 2c) Be sure electrical connections are tight.)

IGNITION SYSTEM
UNIT IX

JOB SHEET #3--ADJUST BREAKER POINTS

I. Materials and tools needed

   A. Screwdriver

   B. Thickness gage

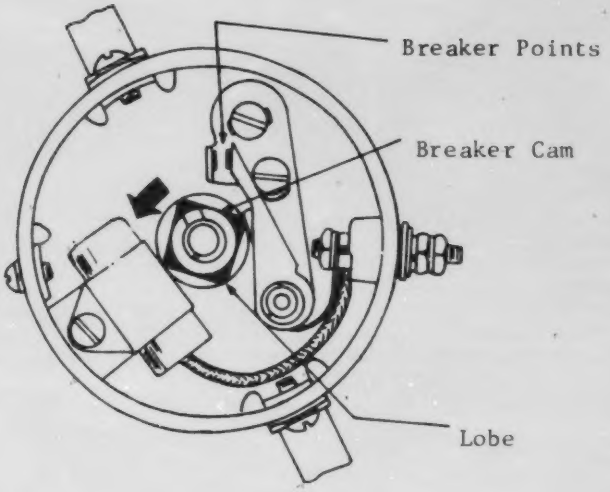
   C. Clean rags

   D. Smooth paper strip

II. Procedure

   A. Turn engine until cam opens breaker points to widest position (Figure 1)

FIGURE 1

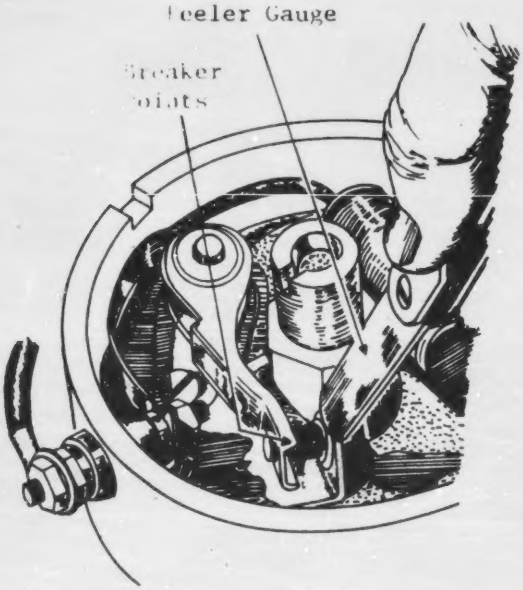

Breaker Points
Breaker Cam
Lobe

JOB SHEET #3

B. Check points for proper spacing (Figure 2)

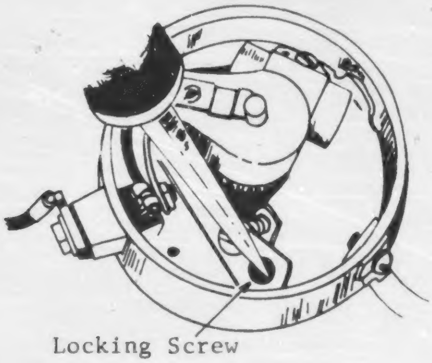
(NOTE: Use a feeler gage of the thickness recommended for your tractor. This may vary from .010 to .028. The proper width gap is provided when there is a slight drag on the feeler gage as you pull it between the contact points. If adjustment is needed, proceed with step C.)

FIGURE 2



C. Loosen lock screw on bracket that provides adjustment (Figure 3)

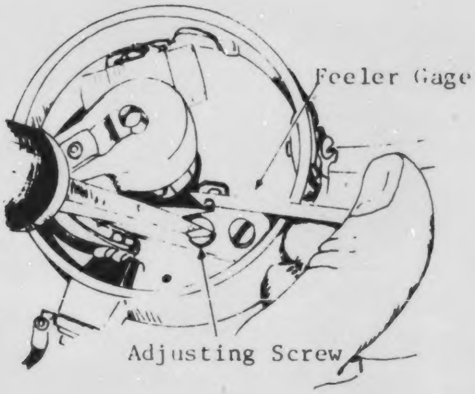
FIGURE 3



JOB SHEET #3

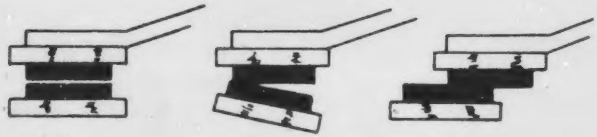
D. Adjust points for proper spacing and alignment (Figure 4)

FIGURE 4



(NOTE: Be sure the breaker-point faces fit together squarely.) (Figure 5)

FIGURE 5



(a) Breaker points should fit together squarely to keep down wear.

(b) and (c) Only partial contact causes arcing and uneven wear.

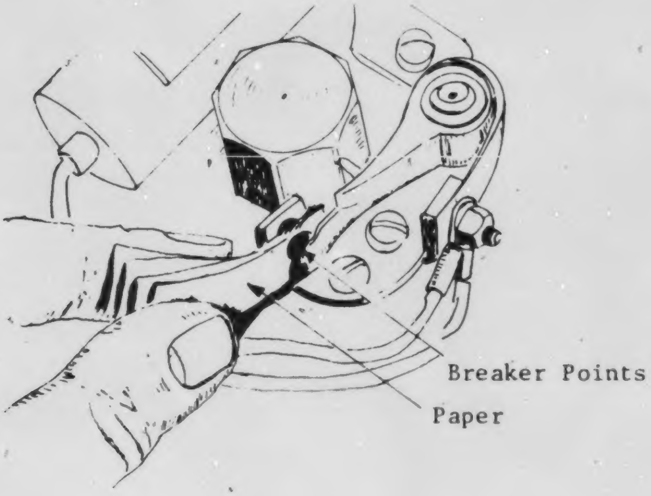
E. Lock breaker point in position with lock screw

JOB SHEET #3

F. Recheck gap between points and wipe points clean (Figure 6)

(NOTE: Run a strip of paper or a clean cloth between the contacts to remove any grease or dirt particles. A crisp dollar bill may be used to clean points.)

FIGURE 6



JOB SHEET #4

TIMING AN ENGINE BY THE BREAKER-POINT METHOD

1. Tools and materials needed

   A. Set of box-end wrenches

   B. Screwdriver

   C. Piece of chalk

   D. Cleaning rags

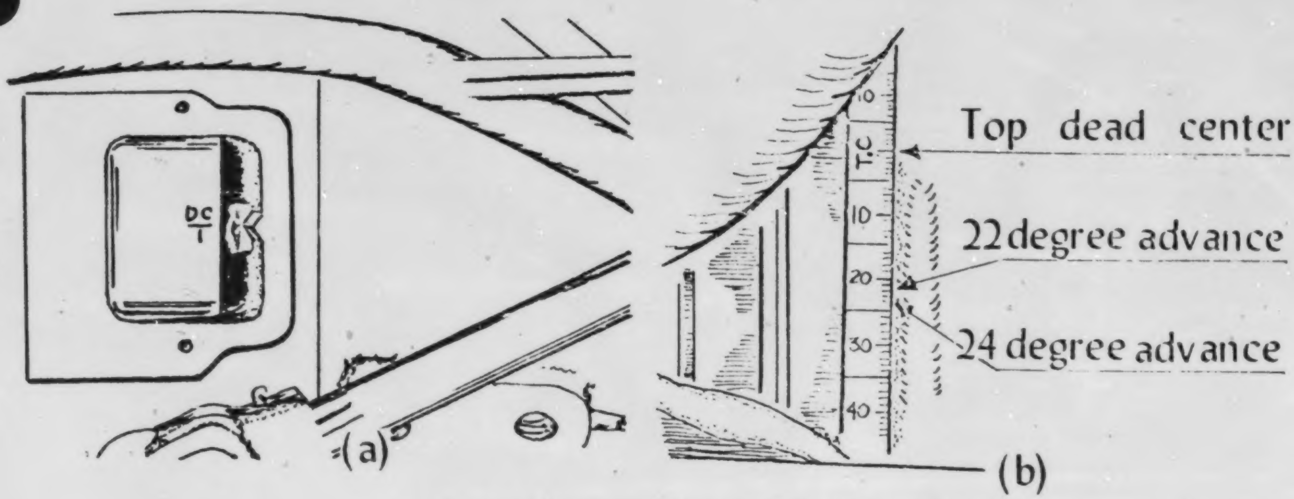
   E. Paper towel

   F. Timing Light

11. Procedure

   A. Locate timing marks on flywheel or fan pulley (Figure 1)

Figure 1


DC
T
(a)
10
T.C
10
20
30
40
Top dead center
22 degree advance
24 degree advance
(b)

(a) One type of Flywheel Marking indicating top dead center position on No. 1 cylinder. (b) Markings on Fan-Belt Drive Pulley indicating top dead center and various advance positions.

   B. Loosen or remove sparkplug from No. 1 cylinder

   C. Remove distributor cap

JOB SHEET #4

D. Crank the engine until No. 1 cylinder starts compression stroke

(NOTE: Watch the way the distributor rotor is turning.)

E. Continue to rotate slowly until proper marking appears on flywheel or fan-shaft pulley

(NOTE: Check operator's manual)

F. Remove rotor and dust cap

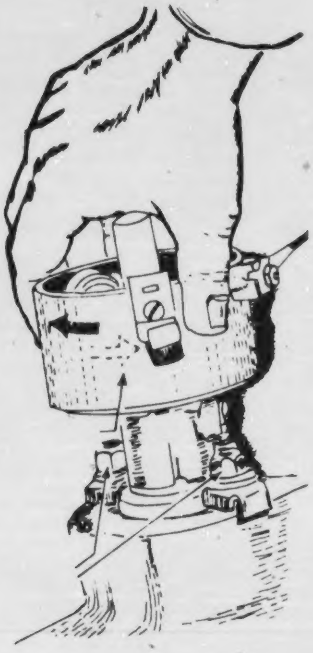
G. Note if breaker points are just starting to open.

(NOTE: If breaker points are just starting to open, the timing is satisfactory and you may now reassemble the distributor. If points are closed or just closing, engine is not timed correctly and the following procedure should be used.)

H. Timing procedure:

1. Loosen clamps that hold distributor to engine block
2. Turn the distributor body slowly in the direction the rotor normally turns to make sure the points are completely closed. (See Figure 2)

FIGURE 2



JOB SHEET #4

3. Turn the distributor body slowing in opposite direction until points start to open

4. Tighten clamps that hold distributor body and reassemble distributor

   (NOTE: The ignition should now be correctly timed.)

I. Tighten No. 1 spark plug and attach sparkplug wire

J. Start the engine to see if it operates satisfactorily

(NOTE: If the engine is not firing on all cylinders or is backfiring, probably some of the sparkplug wires came loose from the distributor and were replaced in the wrong openings of the distributor cap.)

K. If you removed a cover from over the timing hole, replace it.

JOB SHEET #5

TIMING AN ENGINE BY THE TIMING-LIGHT METHOD

1. Tools and materials needed

   A. Set of box-end wrenches

   B. Screwdriver

   C. Piece of chalk

   D. Cleaning rags

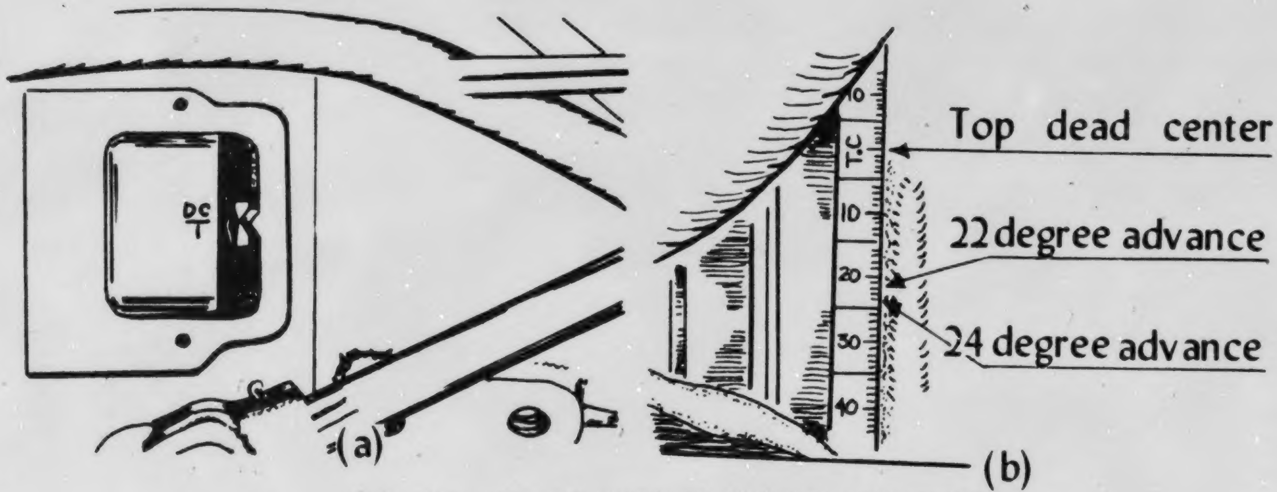
   E. Paper towel

   F. Timing Light

11. Procedure

   A. Locate timing marks on flywheel or fan pulley (Figure 1)

Figure 1


DC
T
(a)
10
T.C
10
20
30
40
Top dead center
22 degree advance
24 degree advance
(b)

(a) One type of FLYWHEEL MARKING indicating top dead center position on No. 1 cylinder. (b) Markings on FAN-BELT DRIVE PULLEY indicating top dead center and various advance positions.

   B. Connect timing light as recommended

   C. Determine from the operator's manual the timing mark to use

JOB SHEET #5

D. Chalk the timing mark so it is easy to see

E. Start engine and run at speed recommended in the operator's manual.

F. Direct timing light at markings of the flywheel or on the fan pulley.

(NOTE: Hold the timing light directly over the pointer. Holding it at an angle may cause timing to be too fast or too slow. When correctly timed, the proper timing mark will appear to stand directly in front of the pointer. If not, proceed with the following steps.)

G. Loosen clamps that hold distributor

H. Turn distributor body slightly until timing mark is opposite pointer

I. Tighten distributor and remove timing light

J. Replace cover over timing hole, if one was removed

IGNITION SYSTEM
UNIT IX

TEST

1. Match the terms on the right with the proper definition.

_____a. Carries low voltage from the battery to the primary side of the ignition coil (light wire)

_____b. Holds the coil and spark plug wires in a sequence and provides a cover for the distributor

_____c. Regulate the timing of the high voltage circuit for best ignition during all speed and load conditions

_____d. Contains the contact points and condensor; distributes the high voltage current from the coil to the proper cylinder

_____e. Make and break the primary circuit to allow the coil to produce high voltage at the spark plugs

_____f. Reduces voltage in the primary circuit to protect the contact points

_____g. A source of electrical power

_____h. Opens and closes the primary circuit from battery to the contact points

_____i. Transforms low voltage into high voltage necessary to jump the spark plug gap

_____j. Stores extra current as the contact points open to prevent arcing and burning

1. Battery
2. Ignition switch
3. Resistance unit
4. Ignition coil
5. Contact points
6. Condensor
7. Breaker cam
8. Spark-advance mechanisms
9. Rotor
10. Distributor cap
11. Spark plug
12. Primary ignition wire
13. Secondary ignition wire
14. Distributor

_____k. Opens and closes the contact

_____l. Takes the high voltage current from the coil and directs it to the correct cylinder

_____m. Provides a spark gap inside the engine cylinder to ignite the fuel air mixture

_____n. Carries high voltage from the secondary side of the coil to the spark plug (heavily insulated wire)

2. Explain in writing the purpose of the ignition system.

3. Select from the list below the components of the primary and secondary ignition curcuits. Place an "X" by the correct components.

   a. Primary--Low voltage circuit

      _____1) Battery

      _____2) Rotor

      _____3) Ignition switch

      _____4) Spark plug

      _____5) Contact points

      _____6) Condensor

   b. Secondary--High voltage circuit

      _____1) Secondary winding of the coil

      _____2) Distributor cap

      _____3) Resistance unit

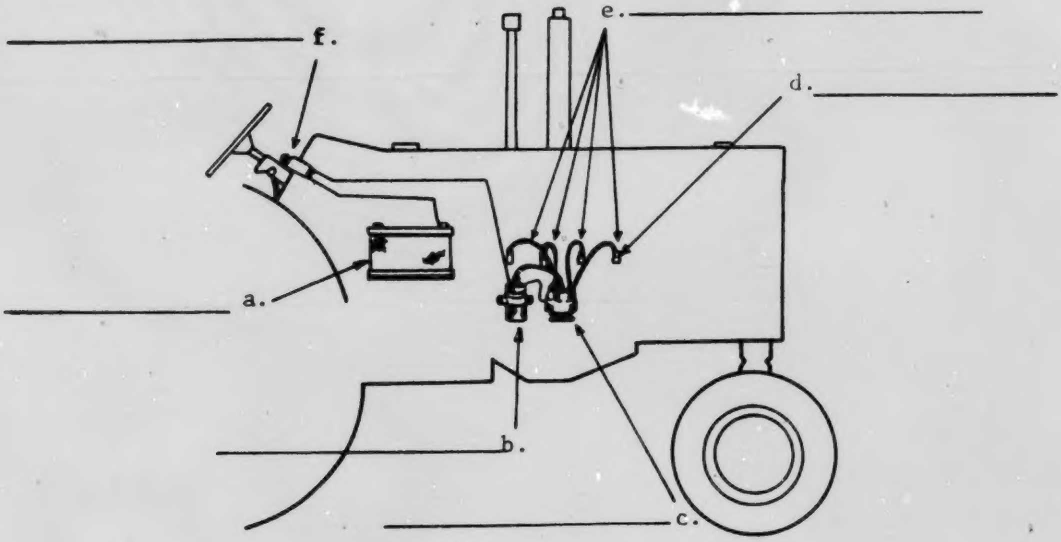
      _____4) Rotor

6. List two reasons for badly burned points.

   a.

   b.

4. Identify the parts of a battery-powered ignition system.



5. Identify the components of the distributor by matching the component to the illustration on the right.

_____a. Distributor cap

_____b. Rotor

_____c. Centrifugal advance mechanism

_____d. Condensor

_____e. Vacuum advance

_____f. Breaker plate

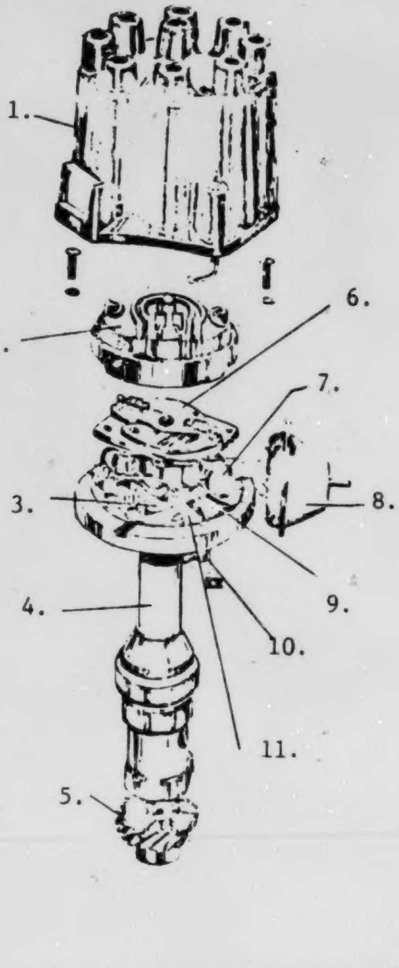
_____g. Distributor cam

_____h. Contact points

_____i. Distributor housing

_____j. Primary lead wire

_____k. Distributor drive gear



7. Name two methods of timing an engine

   a.

   b.

8. List two reasons why engine timing is important

   a.

   b.

9. Name three indications of timing being too early.

   a.

   b.

   c.

10. Name two indications of timing being too late.

    a.

    b.

11. Demonstrate the ability to:

    a. Check the condition of the distributor.

    b. Replace breaker points.

    c. Adjust breaker points.

    (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

    d. Time an engine by the breaker-point method.

    e. Time an engine by the timing-light method.

IGNITION SYSTEM
UNIT IX

ANSWERS TO TEST

1. a. 12
   b. 10
   c. 8
   d. 14
   e. 5
   f. 3
   g. 1
   h. 2
   i. 4
   j. 6
   k. 7
   l. 9
   m. 11
   n. 13

2. To produce high voltage current to ignite the fuel air mixture in the engine cylinders.

3. a. 1)
      3)
      5)
      6)
   b. 1)
      2)
      4)

4. a. Battery
   b. Ignition coil
   c. Distributor
   d. Spark plugs
   e. Spark-plug wires
   f. Ignition switch
5. a. 1
   b. 2
   c. 6
   d. 7
   e. 8
   f. 11
   g. 9
   h. 3
   i. 4
   j. 10
   k. 5
6. Any two of the following:
   a. Oil or foreign material on the contact surfaces
   b. A contact-point gap adjustment that is either too wide, too close, or points that are out of alignment
   c. A defective condensor
7. a. The breaker-point method
   b. The timing-light method
8. a. Increase horsepower
   b. Decrease fuel consumption

9. Any 3 of the following:

    a. Retarded spark causes late timing

    b. Exhaust gases escape while they are still quite hot

    c. Wastes power

    d. Increase in exhaust gas temperature

    e. Warped valves

10. a. Engine may knock

    b. Increased temperature within the cylinder

11. Performance skills will be evaluated to the satisfaction of the instructor.

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

TERMINAL OBJECTIVES

After completion of Unit X, the student should be able to match terms associated with servicing the cooling system of farm tractors and identify the parts of the cooling system. The student should be able to match the type corrosion and deposits with the probable cause and demonstrate the ability to flush or clean the cooling system and test the pressure of a cooling system. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

1. Match terms associated with servicing the farm tractor's cooling system.
2. Identify the parts of a tractor's cooling system
3. List three jobs that the cooling system must perform.
4. Select from a list the reasons a pressure type radiator cap is used with forced circulation cooling system.
5. Select from a list the reasons a permanent antifreeze solution should be used in a cooling system at all times.
6. List the problems that result when an engine overheats.
7. Match the type corrosion and deposits found in a cooling system with the probable cause.
8. Name two ways to protect a cooling system from rust.
9. Demonstrate the ability to:
    a. Flush or clean the cooling system.
    b. Pressure test the cooling system.

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in the job sheets
7. Give test

Students:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4 Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    TM 1--Cooling System Components
    TM 2--Pressure-Type Radiator Cap
4. Job Sheets
    #1--Flushing or Cleaning the Cooling System
    #2--Pressure Testing the Cooling System
5. Test
6. Answers to test

References:

1. Tractor Maintenance. American Association for Vocational Instructional Materials, Engineering Division, Athens, Georgia 30601: Foote and Davis (Division of McCall Printing Co.), 1970.

2 Auto Mechanics Instructional Units. Oklahoma State Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, Stillwater, Oklahoma,1971.

SERVICING THE TRACTOR COOLING SYSTEM
UNIT X

INFORMATION SHEET

I. Terms and definitions

   A. Water pump--A centrifugal pump mounted at the front of the cylinder block to circulate the coolant throughout the cooling system

   B. Water jacket--The passages through the block and cylinder head that allows the coolant to circulate around the cylinders, valves, and combustion chambers

   C. Radiator--A device for holding a considerable volume of coolant in close contact with a large amount of air so that heat may be transferred from the coolant to the air

   D. Fan--The device generally mounted on the water pump hub assembly used to pull a large volume of air through the openings in the radiator core

   E. Shroud--A funnel-like structure attached to the radiator and extending around and behind the fan used to make the fan more effective in pulling air through the radiator

   F. Thermostat--A heat controlled valve used in the cooling system to regulate the flow of coolant between the cylinder block and radiator

   G. Pressure cap--A cap which increases the pressure within the cooling system several pounds per square inch allowing the coolant to circulate at higher temperatures without evaporation or surge loss

   H. Radiator hose--The hose used to connect the radiator to the engine

   I. V-Belt--The belt turned by a pulley on the front of the crank shaft used to drive the water pump, fan, and other engine accessories

II. Parts of a cooling system (Transparency 1)

III. Jobs the cooling system performs

   A. Removes surplus or unwanted heat

   B. Maintains an efficient temperature under all operating conditions

   C. Brings an engine, when started, up to operating temperature as soon as possible

INFORMATION SHEET

IV. Reasons a pressure type radiator cap is used with forced circulation cooling systems

A. Makes it possible for the tractor to operate at high temperatures

(NOTE: Water at a temperature of 185 degrees F. to 195 degrees F. is so hot it tends to vaporize readily. Without a pressure cap, water vapor would be free to pass through the overflow tube and you would probably have to refill the radiator several times a day. With a pressure cap the vapor is held inside the radiator.)

B. It acts as a pressure-release valve (Transparency 2)

(NOTE: If the pressure in the radiator gets above the pressure exerted by the spring, the cap permits air or vapor or both to pass into the upper section and out through the overflow tube.)

C. Vacuum valve fits in the center of the pressure-release valve and allows air to enter the radiator when the coolant cools

(NOTE: Without a vaccum valve, a vacuum would develop when the engines cools causing the radiator hoses to collapse and air leaks to develop around the water-pump shaft and any weak spots in the radiator.)

V. Reasons for using a permanent type antifreeze

A. Prevents coolant from freezing

B. Boiling point of permanent antifreeze is higher than water

C. Reduces the corrosive action of water

(NOTE: Additives to permanent type antifreezes deteriate with time and must be changed after two years.)

VI. Problems that result when an engine overheats

A. Sticking and burned valves

B. A cracked engine head or block

C. Excessive knock

(NOTE: Excessive knock is a result of hot spots that develop and cause incoming fuel to ignite before the spark plug fires.)

VII. Causes of corrosion and deposits found in a cooling system

A. Mineral deposits--Result from repeated additions of hard water that contains alkali (live or magnesium) or minerals (iron)

INFORMATION SHEET

B. Rust--When water and oxygen are both present, there is a natural tendency for iron parts in the cooling system to rust

C. Galvanic corrosion--(sometimes called electrolytic corrosion) Caused by small electric currents that are set up where two or more different metals are in contact in the cooling system

(NOTE: This action is similar to that of a flashlight battery in which certain metal parts are gradually eaten away and perforated.)

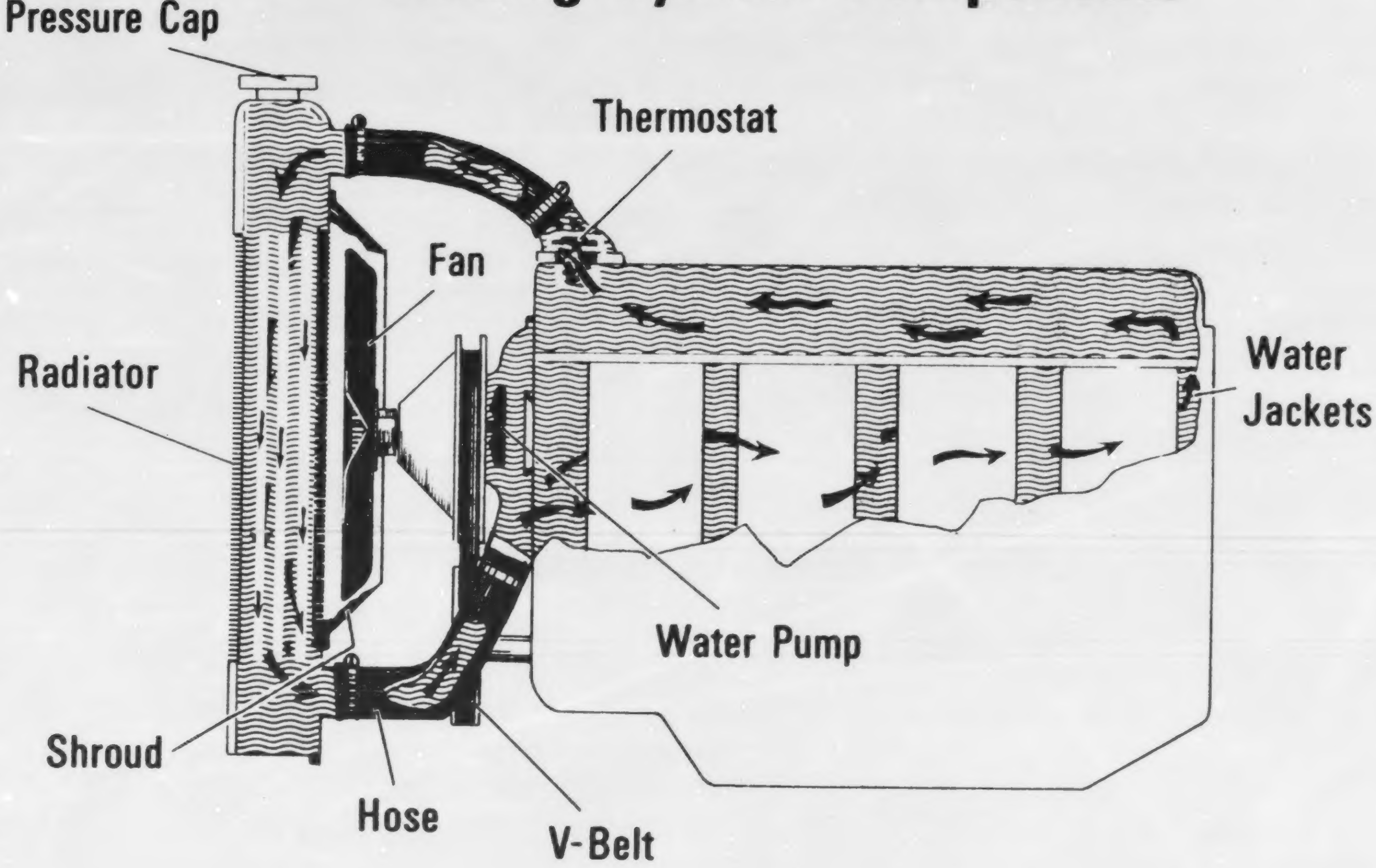
VIII. Protecting a cooling system from rust

A. Use a chemical inhibitor that combines with the metal surface to give a protective coating

B. Use a soluble-oil inhibitor which settles out of the water and provides protection by coating the surfaces in the cooling system

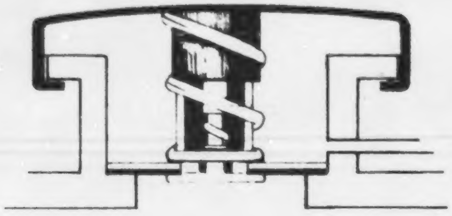
(NOTE: Some manufacturers include both types of protection in their anti-rusts.)

Cooling System Components


Pressure Cap
Thermostat
Fan
Radiator
Water Jackets
Water Pump
Shroud
Hose
V-Belt

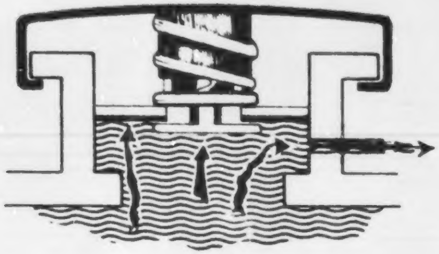
Pressure Type Radiator Caps

Normal Operation



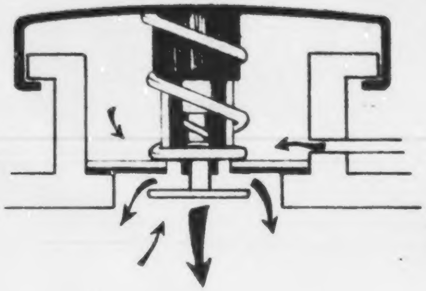
Valves Closed

Excessive Pressure



Pressure Valve Open

Cooling-Off Period



Vacuum Valve Open

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

JOB SHEET #1--FLUSHING OR CLEANING THE COOLING SYSTEM

I. Tools and materials needed

   A. Commercial flushing compound--Used when system is in good condition

   B. Commercial cooling system cleaner--Use when there is considerable evidence of scale and rust

   C. Cardboard or blanket to reduce air flow through radiator

   D. Water supply

   E. Adjustable pliers

   F. Screwdriver

II. Procedure

   (NOTE: The procedures are determined by the chemicals being used.)

   A. Read the instructions on the container

      (NOTE: You may be able to add the contents directly to the present coolant. If antifreeze is in the cooling system, the instructions may indicate that the coolant be drained and replaced with water.)

      1. If cleaner of flushing compound is to be added to present coolant, proceed with step B

      2. If present coolant should be replaced with water, proceed with the following substeps:

         a. Run engine until thoroughly warmed

            (NOTE: When engine is warmed enough, the thermostat valve is open and will allow more complete drainage. Cover radiator to be certain engine warms.)

         b. Completely drain cooling system while engine is still warm

            (NOTE: Some tractors have only one drain cock but most have two or three--one on the radiator and one or two on the engine block.)

         c. Close drain cocks

JOB SHEET #1

d. Refill cooling system with water
(NOTE: If engine is hot, allow it to cool, then add water slowly to avoid cracking engine block or head. Allow enough space to add the flushing compound or cleaner without causing the coolant to overflow. Temperature of water being added should approximately be the temperature of the engine.)

B. Add flush compound or cleaner

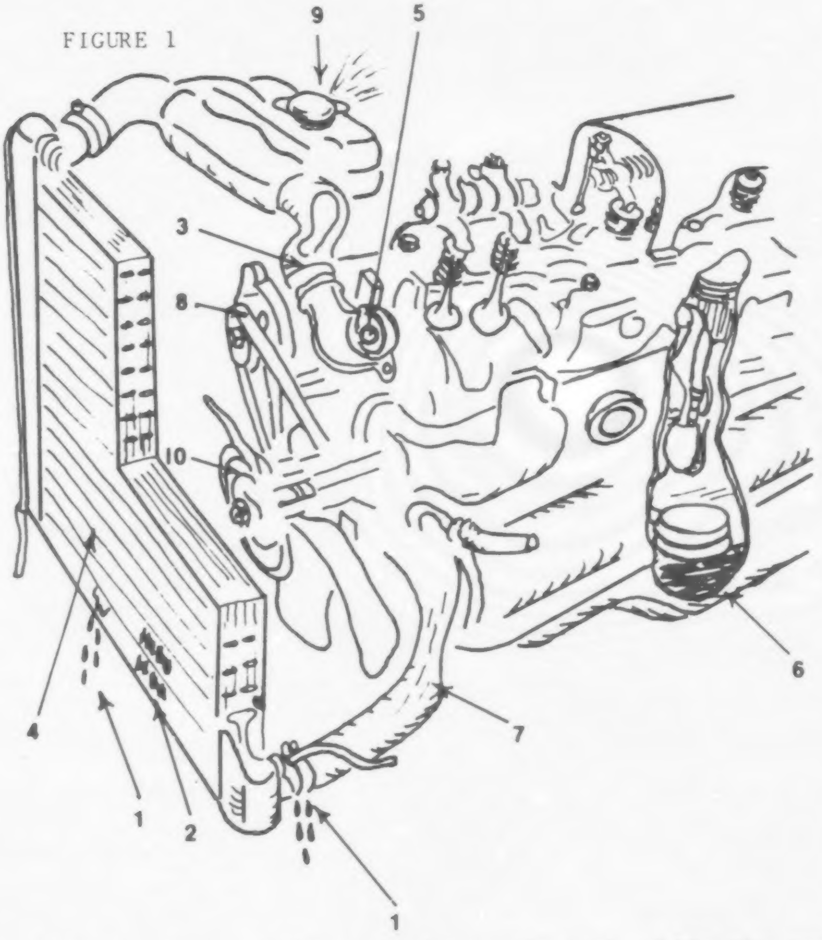
C. Start engine and operate until normal operating temperature is reached

(NOTE: Cover the engine so it will heat quickly and completely. Do not allow the coolant to boil.)

D. Check external condition of cooling system (Figure 1)

(NOTE: Illustration enclosed indicates points that should be checked.)

FIGURE 1



1. External Leakage
2. Rust Deposits
3. Air Suction
4. Clogged Air Passages
5. Stuck Thermostat
6. Sludge Formation in Oil
7. Hose Failure
8. Worn Fan Belt
9. Pressure Cap Leakage
10. Temperature Control Fan Drive

(NOTE: Most of these checks can be made while the engine is operating. If leak is found that can not be fixed with a new hose or by tightening a hose clamp, the tractor should be taken to a competent repairman.)

JOB SHEET #1

E. Completely drain cooling system

F. If acid-base cleaner was used be sure to use a neutralizer

   1. Add neutralizer provided and fill cooling system

   2. Run engine about ten minutes, then drain

   3. Flush cooling system with water

G. Refill with coolant

   1. Use clean soft water and a rust inhibitor or new antifreeze solution with soft water

      (NOTE: Do not use old antifreeze with a new can of rust inhibitor. Because of different chemical compounds used for rust inhibitors the new and old antifreeze inhibitors may offset each other so neither is effectives.)

   2. If you install entifreeze refer to the operator's manual for the cooling system capacity of your tractor

H. Clean radiator externally by using compressed air or water

   (NOTE: Compressed air or water should be applied from fan side of radiator.)

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

JOB SHEET #2--PRESSURE TESTING THE COOLING SYSTEM

I. Tools and equipment--Radiator pressure tester

II. Procedure

A. Remove radiator cap

(CAUTION: Never remove the radiator cap quickly when the engine is hot. If cap must be removed when hot, loosen cap to first stop and leave in this position until all pressure is released. Cap can then be removed safely.)

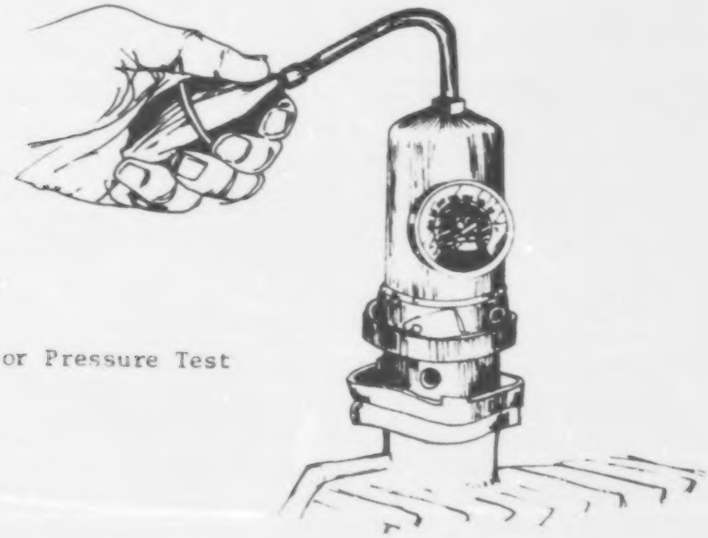
B. Wipe the radiator filler cap seat clean

C. Attach the radiator pressure tester

D. Apply pressure

(NOTE: Pressure applied should not exceed recommended cooling system pressure by more than 1 psi.) (Figure 1)

FIGURE 1



Radiator Pressure Test

E. Make sure pressure holds steady--Indicates cooling system is not leaking

JOB SHEET #2

F. Check to see if pressure drops

(NOTE: Check for external leaks--hose connections, expansion plugs, water pump, and radiator.)

G. Watch to see if pressure drops, but external leaks are not visible

(NOTE: Remove tester; start and run engine until operating temperature is reached.)

H. Re-attach tester and apply cooling system pressure

I. Increase engine speed to half throttle

J. If pressure needle fluctuates, this indicates a combustion leak

K. If pressure meter needle does not fluctuate, sharply accelerate engine several times and check for a discharge of water from the tailpipe

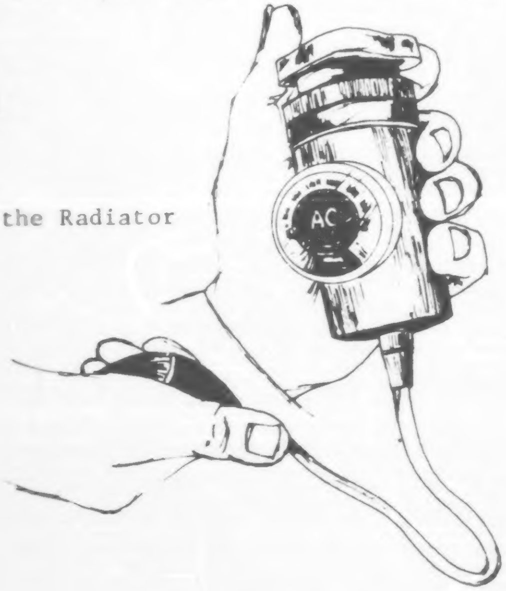
(NOTE: If an abnormal amount of water is discharged at the tailpipe, this could indicate a cracked block or head or a defective head gasket. Check radiator for loss of coolant on tractors having vertical slack or exhaust.)

L. Test the pressure cap

(NOTE: Use same tester with adapter to test cap. If the cap does not hold the rated pressure, it should be replaced.) (Figure 2)

FIGURE 2

Testing the Radiator Cap



M. With test completed, check coolant level and reinstall cap

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

TEST

1. Match the terms on the right to the proper definition.

_____a. A centrifugal pump mounted at the front of the cylinder block to circulate the coolant throughout the cooling system

_____b. The belt turned by a pulley on the front of the crank shaft used to drive the water pump, fan, and other engine accessories

_____c. A heat controlled valve used in the cooling system to regulate the flow of coolant between the cylinder block and radiator

_____d. The hose used to connect the radiator to the engine

_____e. A cap which increases the pressure within the cooling system several pounds per square inch allowing the coolant to circulate at higher temperatures without evaporation or surge loss

_____f. A funnel-like structure attached to the radiator and extending around and behind the fan used to make the fan more effective in pulling air through the radiator

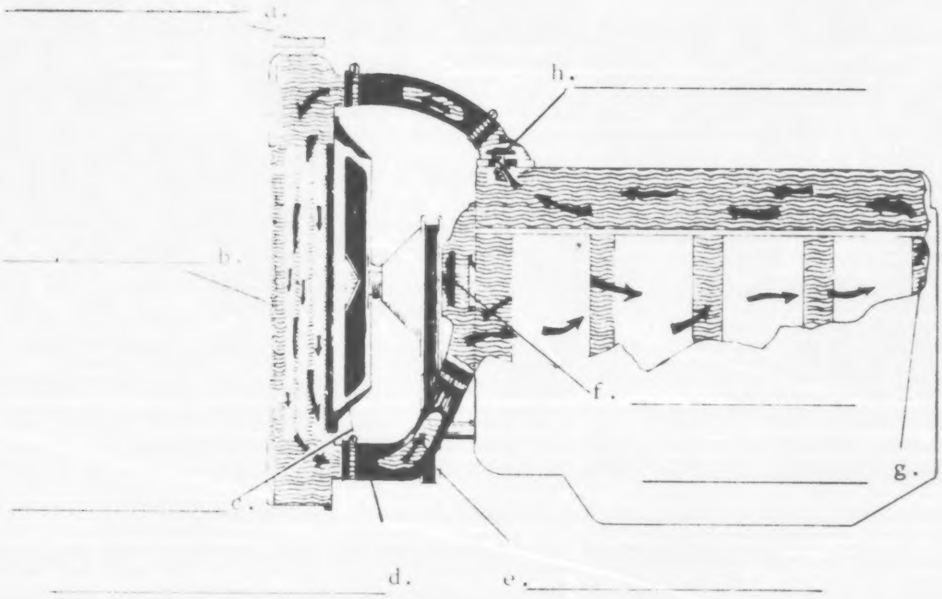
_____g. The passages through the block and cylinder head that allow the coolant to circulate around the cylinders, valves, and combustion chambers

_____h. A device for holding a considerable volume of coolant in close contact with a large amount of air so that heat may be transferred from the coolant to the air

_____i. The device generally mounted on the water pump hub assembly used to pull a large volume of air through the openings in the radiator core

1. Water pump
2. Water jackets
3. Radiator
4. Fan
5. Shroud
6. Thermostat
7. Pressure cap
8. Radiator hose
9. V-Belt

2. Identify the parts to the cooling system using the illustration below.



3. List three jobs that the cooling system must perform.

a.

b.

c.

4. Select from the list below the reasons a pressure-type radiator cap is used with forced circulation cooling systems. Place an "X" by the proper answers.

_____a. Makes it possible for the tractor to operate at a low temperature

_____b. It acts as a pressure-release valve

_____c. Vacuum valve fits in the center of the pressure-release valve and allows air to enter the radiator when the coolant cools

_____d. Prevents water from going out overflow tube

5. Select from the list below the reasons a permanent antifreeze solution should be used at all times in a cooling system. Place an "X" by correct answers.

_____a. Prevents coolant from freezing

_____b. Boiling point of permanent antifreeze is lower than water

_____c Reduces the corrosive action of water

_____d. Prevents coolant from boiling

6. List two problems that result when an engine overheats.

a.

b.

7. Match the type corrosion and deposits on the right with the correct cause of each.

_____a. When water and oxygen are both present, there is a tendency for iron parts in the cooling system to rust

_____b. Result from repeated additions of hard water that contains alkali (lime or magnesium) or minerals (iron)

_____c. Caused by small electric currents that are set up where two or more different metals are in contact in the cooling system

1. Galvanic corrosion

2. Rust

3. Mineral deposits

8. Name two ways to protect a cooling system from rust.

   a.

   b.

9. Demonstrate the ability to:

   a. Flush or clean the cooling system

   b. Pressure test the cooling system

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

SERVICING THE TRACTOR--COOLING SYSTEM
UNIT X

ANSWERS TO TEST

1. a. 1
   b. 9
   c. 6
   d. 8
   e. 7
   f. 5
   g. 2
   h. 3
   i. 4

2. a. Pressure cap
   b. Radiator
   c. Shroud
   d. Hose
   e. V-Belt
   f Water pump
   g. Water jackets
   h. Thermostat

3. a. Removes surplus or unwanted heat
   b. Maintains an efficient temperature under all operating conditions
   c. Brings an engine, when started, up to operating temperature as soon as possible

4. b
   c
   d

5. a

   c

6. Any two of the following:

   a. Sticking and burned valves

   b. A cracked engine head or block

   c. Excessive knock

7. a. 2

   b. 3

   c. 1

8. a. Use a chemical inhibitor that combines with the metal surface to give a protective coating

   b. Use a soluble-oil inhibitor which settles out of the water and provides protection by coating the surfaces in the cooling system

9. Performance skills will be evaluated to the satisfaction of the instructor.

SPRAY PAINTING
UNIT XI

TERMINAL OBJECTIVES

After completion of Unit XI, the student should be able to recognize the various parts of a spray gun and name their functions. He should be able to develop skills in painting with a spray gun and demonstrate procedures for cleaning the gun. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Identify the parts of a spray gun when given a drawing illustrating the parts.
2. Name five tools necessary for spray painting.
3. Identify the two types of spray guns.
4. Identify the two types of adjustments found on a spray gun when given a drawing illustrating the adjustments.
5. List the function of each adjustment found on a spray gun.
6. List six steps to follow in the adjustment of a spray gun.
7. Demonstrate the ability to:
    a. Prepare paint for spray painting
    b. Use the spray gun
    c. Clean the spray gun

SPRAY PAINTING
UNIT XI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheets
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Students:

1. Read objectives
2. Study information sheets
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    - TM 1--Parts of Spray Gun
    - TM 2--Types of Spray Guns
    - TM 3--Spray Gun Adjustment
4. Job sheets
    - #1--Prepare Paint for Spray Painting
    - #2--Use the Spray Gun
    - #3--Clean the Spray Gun
5. Test
6. Answers to test

References:

1. Instructional Materials for Vocational Agriculture I, Teaching Materials Center, Agricultural Education Department, Texas A&M University, College Station, Texas.

2. Finishing Materials and Methods, George A. Soderberg, McKnight and McKnight Publishing Company, Bloomington, Illinois.

3. The ABC's of Spray Equipment, The DeVilbiss Company, Toledo, Ohio.

4. Shopwork on the Farm, Mack M. Jones, McGraw-Hill Book Company Inc., New York.

5. Auto Body Repairing and Repainting, Bill Toboldt, The Goodheart-Willcox Company, Inc., Homewood, Illinois.

SPRAY PAINTING
UNIT XI

INFORMATION SHEET

I. Parts of spray gun (Transparency 1)

    A. Air cap

    B. Fluid tip

    C. Fluid needle

    D. Trigger

    E. Fluid adjustment screw

    F. Air valve

    G. Spreader Adjustment valve

    H. Gun body

II. Tools necessary for spray painting

    A. Spray gun

    B. Air compressor

    C. Paint pressure tank

    D. Hose

        1. Air

        2. Paint

    E. Air control device

        1. Gauge

        2 Regulator

III. Types of spray guns (Transparency 2)

    A. Pressure

    B. Suction

INFORMATION SHEET

IV. Spray gun adjustments (Transparency 3)

A. Spreader--Controls air to horn holes which regulates size of spray pattern

(NOTE: Horn holes are holes in the air cap through which air is released.)

B. Fluid adjustment--Controls the travel of the fluid needle which allows more or less material through the fluid tip

C. Procedures for adjusting spray gun

1. Open spreader adjustement valve

2. Open fluid needle screw

3. Check air leaks

4. Connect hose to cup

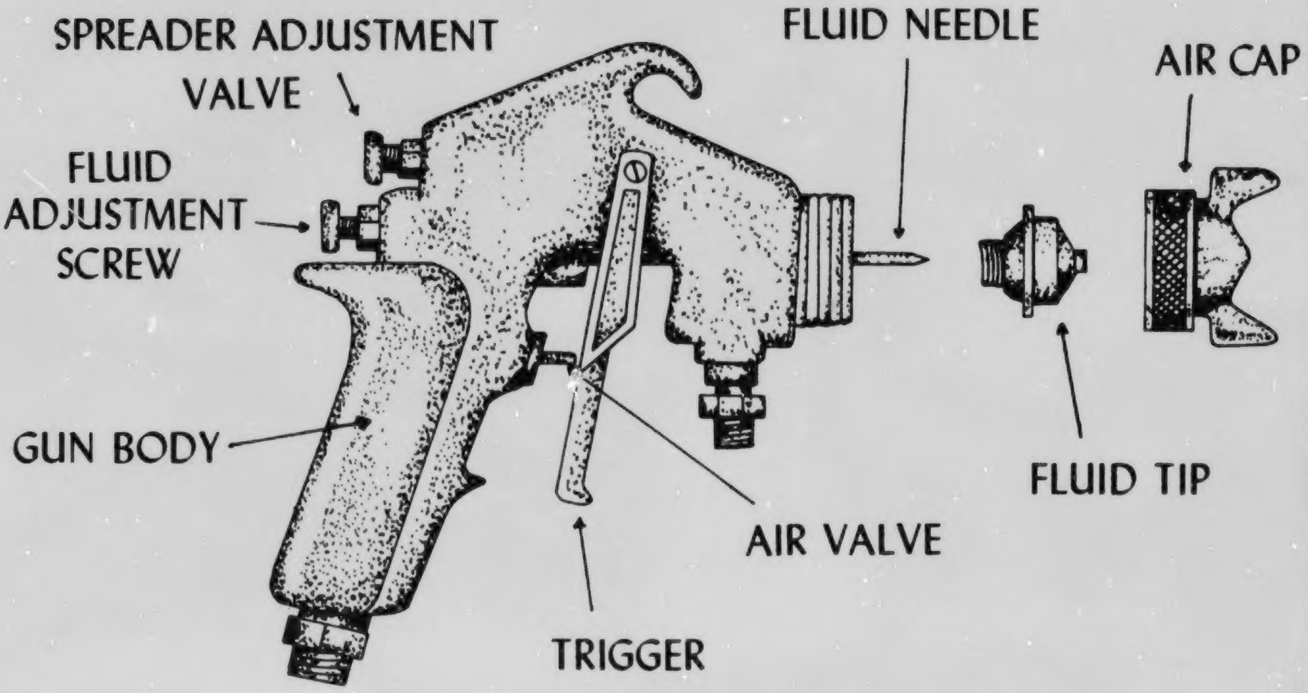
5 Remove nozzle

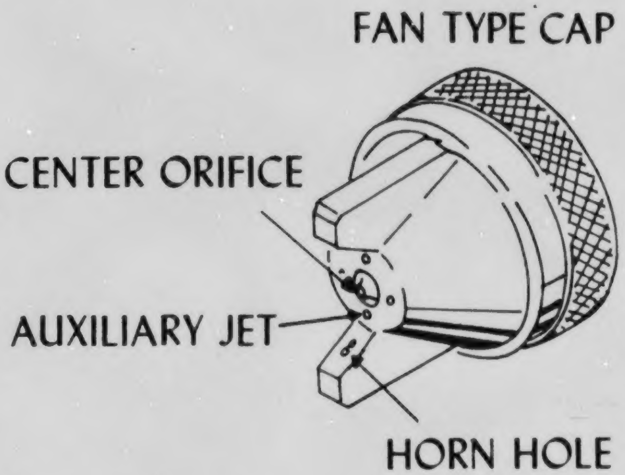
6. Press trigger until paint passes through gun

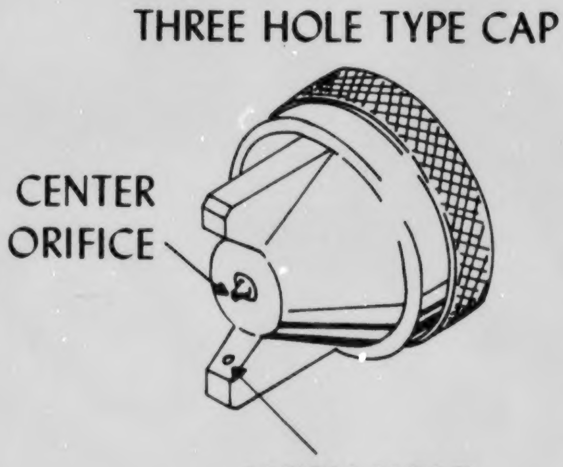
7. Replace nozzle and set pressure

(NOTE: See manufacturer's recommendations.)

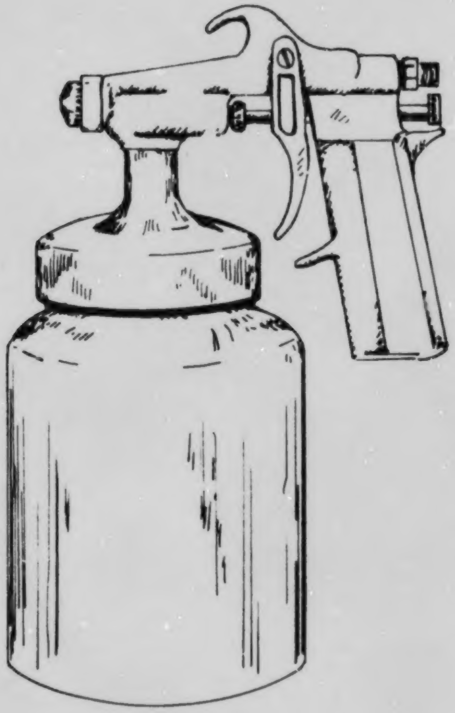
Parts of Spray Gun


SPREADER ADJUSTMENT VALVE
FLUID NEEDLE
AIR CAP
FLUID ADJUSTMENT SCREW
GUN BODY
FLUID TIP
AIR VALVE
TRIGGER

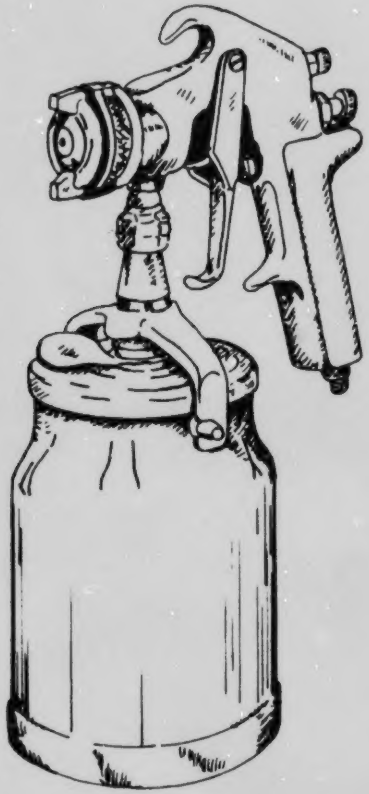

FAN TYPE CAP
CENTER ORIFICE
AUXILIARY JET
HORN HOLE


THREE HOLE TYPE CAP
CENTER ORIFICE
HORN HOLE

Types of Spray Guns



Pressure

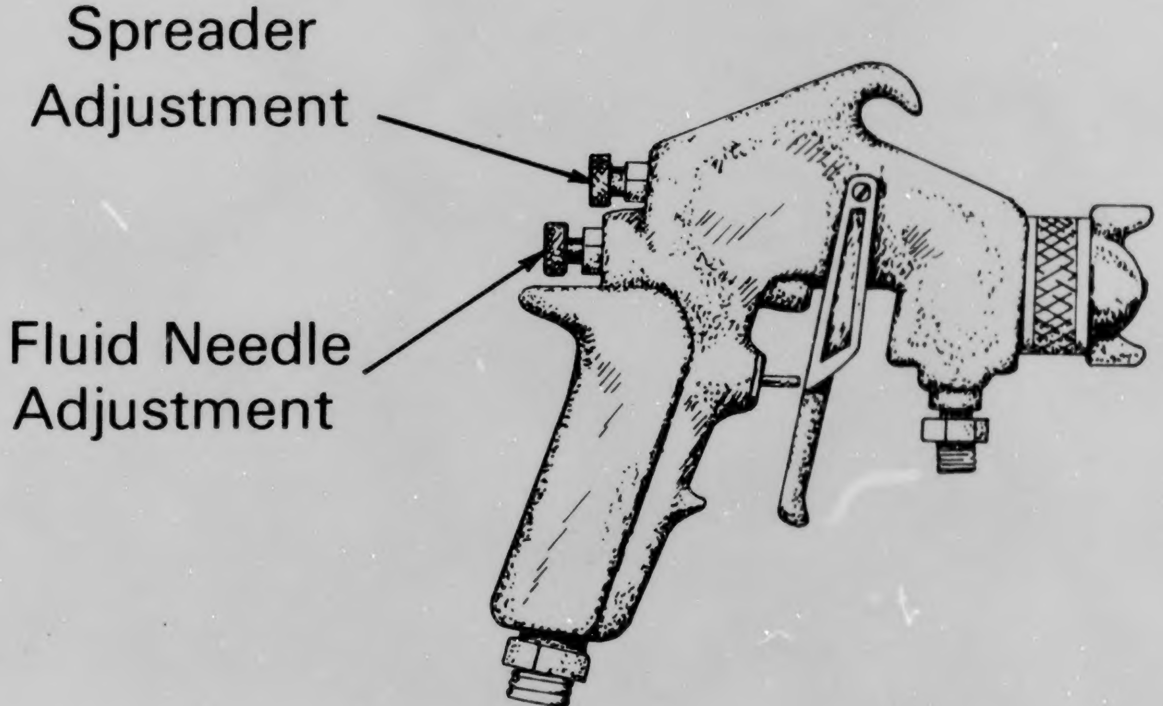


Suction

TM 2

Ag. IV - 387-D

Spray Gun Adjustment


Spreader Adjustment
Fluid Needle Adjustment

SPRAY PAINTING
UNIT XI

JOB SHEET #1--PREPARE PAINT FOR SPRAY PAINTING

I. Tools and materials needed

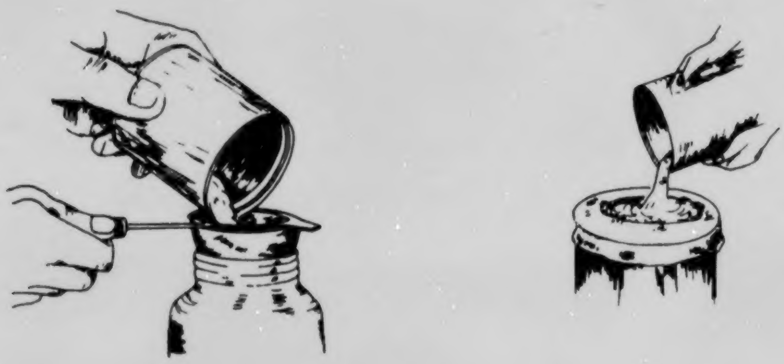
- A. Paint
- B. Large can
- C. Mixing stick
- D. Material for straining paint
    - 1. Tea strainer
    - 2. Nylon hose
    - 3. Cheesecloth
    - 4. Commercial strainers

II. Procedures

- A. Open can and pour off oil material
- B. Stir settled pigment
- C. Return thin material and remix
- D. Add thinner if necessary

  (NOTE: Act according to manufacturer's recommendations.)
- E. Strain to remove lumps and other foreign materials (Figure 1)

FIGURE 1



SPRAY PAINTING
UNIT XI

JOB SHEET #2--USE THE SPRAY GUN

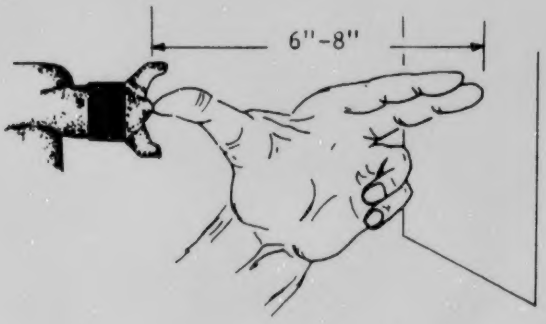
I. Tools and materials needed

- A. Paint
- B. Spray gun and equipment

II. Procedure

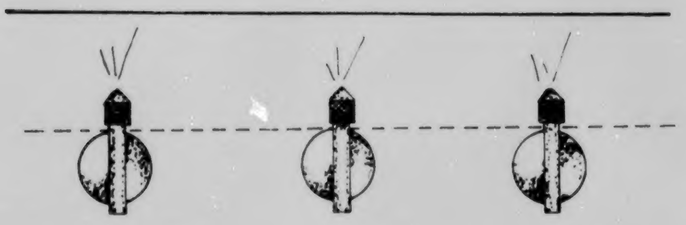
- A. Prepare surface before painting
- B. Hold gun vertically 6 to 10 inches from surface (Figure 1)

FIGURE 1



- C. Move in parallel line with surface (Figure 2)

FIGURE 2



Move Gun in Straight Line

- D. Overlap about half of previous pass

SPRAY PAINTING
UNIT XI

JOB SHEET #3--CLEAN THE SPRAY GUN

I. Tools and materials needed

A. Solvent

B. Clean rags

II. Procedure

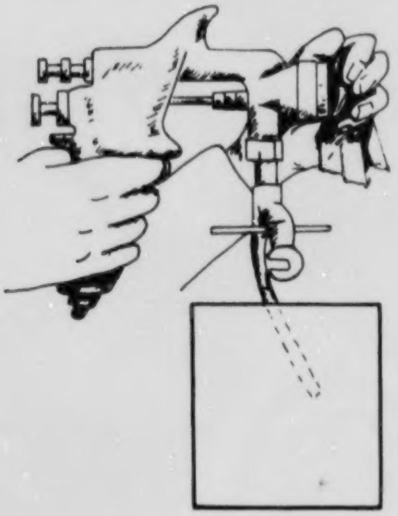
A. Loosen cup from gun

B. Unscrew air cap about two or three turns

C. Place cloth over air cap

D. Pull trigger (Figure 1)

FIGURE 1



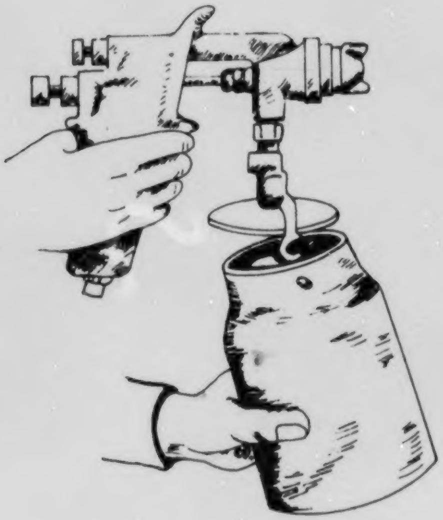
E. Empty contents of cup and replace with small amount of solvent

(NOTE: following this procedure: (1) Empty cup (2) wipe out with rag (3) place small amount of cleaner in cup (4) retighten air nozzle - spray cleaner through.

JOB SHEET #3

F. Spray solvent through gun (Figure 2)

FIGURE 2



G. Remove air cap and clean

H. Wipe off gun with solvent and store for future use

SPRAY PAINTING
UNIT XI

TEST

1. Identify the following parts of the spray gun.

   a.

   b.

   c.

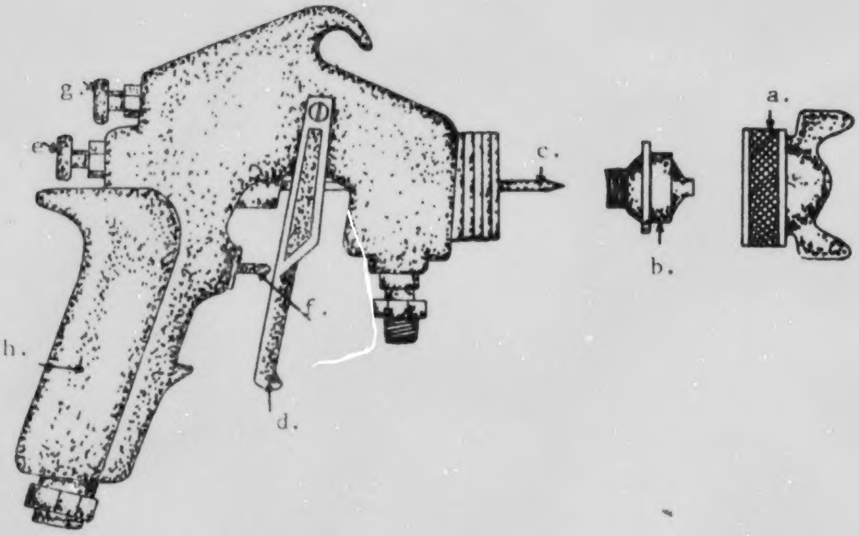
   d.

   e.

   f.

   g.

   h.



2. Name the five tools necessary for spray painting

   a.

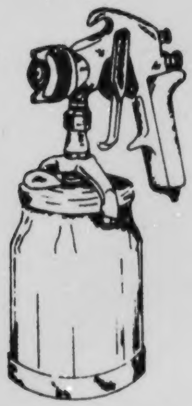
   b.

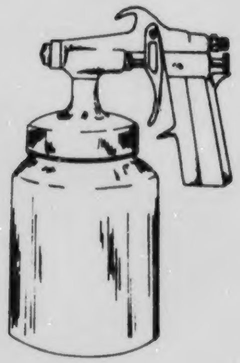
   c.

   d.

   e.

3. Identify the two types of spray guns.





a.______________________________ b.______________________________

4. Identify the two types of adjustments.

   a.

   b.

5. List the function of each adjustment on a spray gun?

   a.

   b.

6. List the six steps to follow in the adjustment of a spray gun

   a.

   b.

   c.

   d.

   e.

   f.

7. Demonstrate the ability to:

   a. Prepare paint for spray painting

   b. Use the spray gun

   c. Clean the spray gun

   (NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

SPRAY PAINTING
UNIT XI

ANSWERS TO TEST

1. a. Air cap
   b. Fluid tip
   c. Fluid needle
   d. Trigger
   e. Fluid adjustment screw
   f. Air valve
   g. Spreader adjustment valve
   h. Gun body
2. a. Spray gun
   b. Air compressor
   c. Paint pressure tank
   d. Hose
   e. Air control device
3. a. Suction fun
   b. Pressure gun
4. a. Spreader adjustment
   b. Fluid adjustment
5. a. Spreader adjustment--Controls air to horn holes which regulates size of spray pattern
   b. Fluid adjustment--Controls the travel of the fluid needle which allows more or less material through the fluid tip
6. a. Open spreader adjustment valve
   b. Open fluid needle screw
   c. Check air leaks
   d. Connect hose to cup
   e. Remove nozzle
   f. Press trigger until paint passes through gun

   g. Replace nozzle and set pressure

7. Performance skills will be evaluated to satisfaction of the instructor.

BALER OPERATION
UNIT XII

TERMINAL OBJECTIVES

After completion of Unit XII, the student should be able to follow basic safety procedures associated with baler operation and maintenance. The student should be able to lubricate, operate, and make basic field adjustments. This knowledge will be evidenced by scoring eighty-five percent on the unit test

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with hay balers
2. List four safety precautions associated with baler operation
3. Identify the parts of a round baler
4. Identify the parts of a square baler
5. List proper time to lubricate a baler at the proper intervals
6. Describe the basic operation of a round baler
7. Describe the basic operation of a square baler

HAY BALERS
UNIT XII

SUGGESTED ACTIVITIES

1. Instructors

   A. Provide students with objective sheet

   B. Provide students with information sheets

   C. Make Transparencies

   D. Give test

11. Students:

   A. Read objectives

   B. Study information sheet

   C. Take Test

INSTRUCTIONAL MATERIALS

1. Included in this unit

   A. Objectives

   B. Information Sheet

   C. Transparency Masters

      TM-1 Round Baler Parts
      TM-2 Square Baler Parts

   D. Test

   E. Answers to Test

11. References

   A. Roto Baler Operator's Manual, Allis Chalmers Corp.

   B. New Holland Operator's Manual (Baler) New Holland, Div. Sperryrand, New Holland, Pennsylvania 17557.

   C. International Harvestor Baler Service Manual, International Harvestor Corp. Chicago, Illinois 60611

   D. John Deere Operators Manual, John Deere Corp.

BALER OPERATION
UNIT XII

INFORMATION SHEET

I. Terms and Definitions

A. Baler--a machine used to compress hay into square or round bales using wire or twine to hold them together

B. Wire Twister--the mechanism on a square baler which twists wire ends together around a bale

C. Twine knotter--the mechanism on a square baler which ties twine around a bale

D. Pickup--part of a baler which picks the hay up off the ground

E. Shear bolt--small steel bolts placed on the flywheel, packer fingers, and needle mechanisms which sheer under heavy load or when a malfunction occurs to stop power transfer

F. Bale Chamber--part of baler where the hay is compressed into bales

G. Needle--part of baler which places the twine or wire in position for tieing mechanism

H. Packerfinger--part of square baler which packs hay into bale chamber

I. Press Rolls--rollers on a round baler which are flat belts driven which press and roll the hay into a cylindrical shape

II. Safety Precautions

A. Don't clean, lubricate, or make adjustments on baler while it is in motion

B. Don't engage clutch until you are certain that everyone is clear of machine

C. Don't work around baler in loose clothing

D. Don't try to pull loose hay from any part of baler while in operation

E. Don't operate baler without all shields in place

III. Parts of round baler (AC) (Transparency 1)

A. Raddle Assembly

B. Right and left shoes

INFORMATION SHEET

C. Feed roll

D. Lower drive roll

E. Press roll

F. Drive chain

G. Raddle Drive

H. Conveyor Balance Spring

I. Twine Needle Assembly

IV. Parts of square baler (Transparency 2)

A. Engine or PTO Power Shaft

B. Jack Stand

C. Flywheel

D. Knotters

E. Bale Measuring Wheel

F. Hydraulic Cylinder

G. Bale Shute

H. Feeder (Packer)

I. Auger

J. Auger

K. Pickup

L. Gauage Wheel

M. Pickup Lift Lever

V. Proper Baler Lubrication

A. Square Baler every 1000 bales (2 1/2 hours of operation under dusty conditions)

B. Round Baler Daily

C. Time mechanism, needle, and plunger may require special attention

VI. Round Baler Operation

(NOTE: Double or tripler windrow for better bales. Make windrow 3 1/2 - 4 1/2 feet wide.)

A. Hay is picked up by conveyor

B. Hay passes under press roll onto lower band

C. The lower bands pull it into the ball chamber

INFORMATION SHEET

D. The bands travel in opposite direction, so the hay is folded over and rolling starts

E. Increasing diameter of bale pulls tension rolls close together and causes trip rolls to move outward

F. This action causes mechanism to stop the conveyor, which signals the operator to stop forward movement

G. Twine is released to be wrapped around bale with the last of the hay

H. The twine is cut and the trip rolls open, ejecting the bale

I. All mechanisms return to original position and conveyor begins, signaling operator to move forward

(NOTE: For threading of twine, size of bale and other basic information see operators manual.)

VII. Square Baler Operation and Adjustment

A. Operation

1. Pickup moves hay up to the auger or gathering tines in some models
2. Auger or tines move hay to ball chamber

   (NOTE: Auger with packer finger and tines have adjustment on them in order to adjust feed according to varied hay conditions. These devices can make difference between even and oblong bales.)
3. Plunger packs and pushes hay through bale chamber
4. Bale length is measured by wheel measuring device which trips and starts knotter mechanism

B. Adjustment--according to operator's manual

1. Gauge wheel
2. Sharpening and adjusting bale chamber knives
3. Adjust bale chamber play
4. Adjust packer finger (feeder)
5. Set flywheel clutch spring pressure
   (NOTE: Winter storage pressure should be released from clutch)
6. Adjust bale weight
   (NOTE: By hydraulic pressure mechanism, manual screw, bale

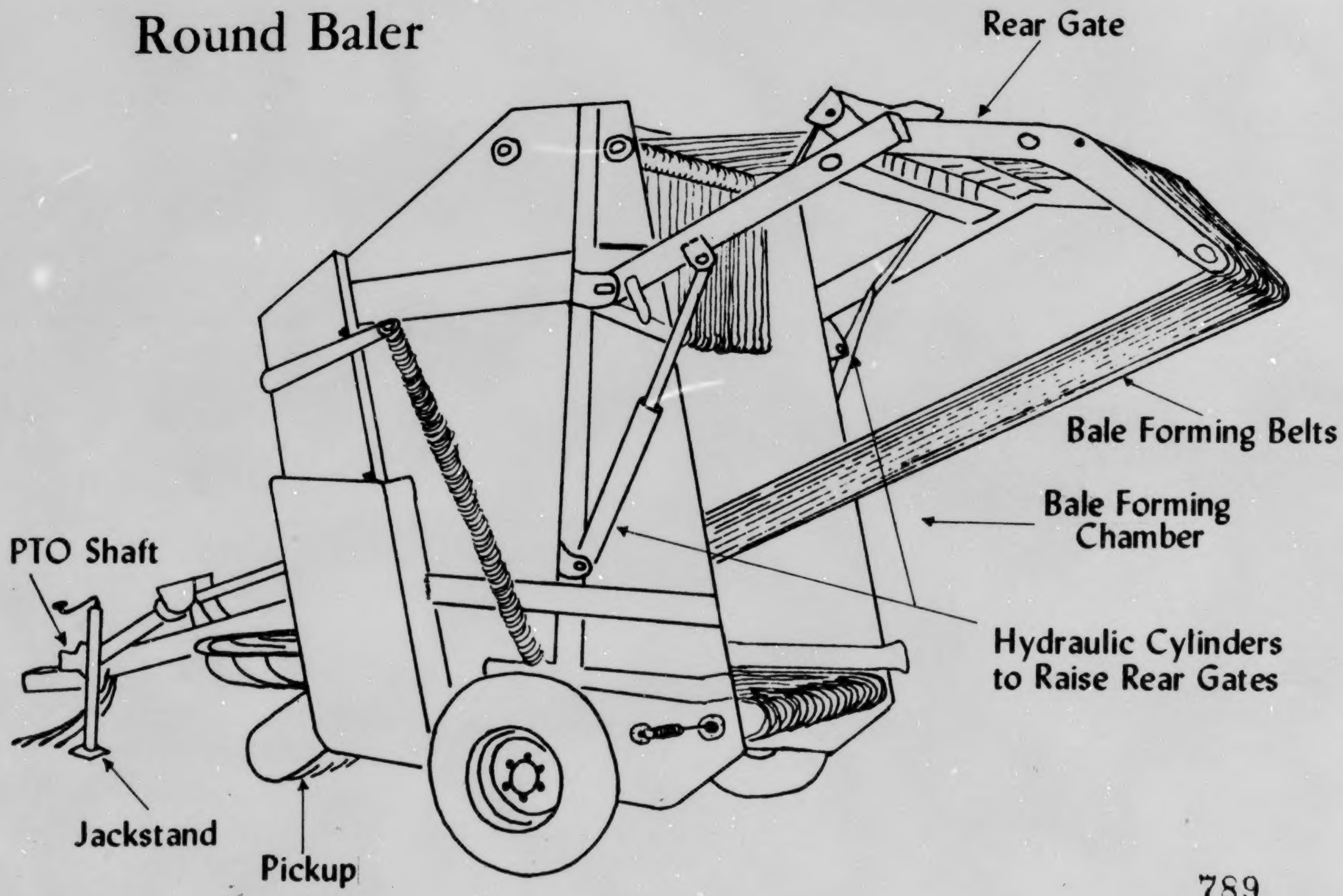
INFORMATION SHEET

chamber wedges, and bale length.)

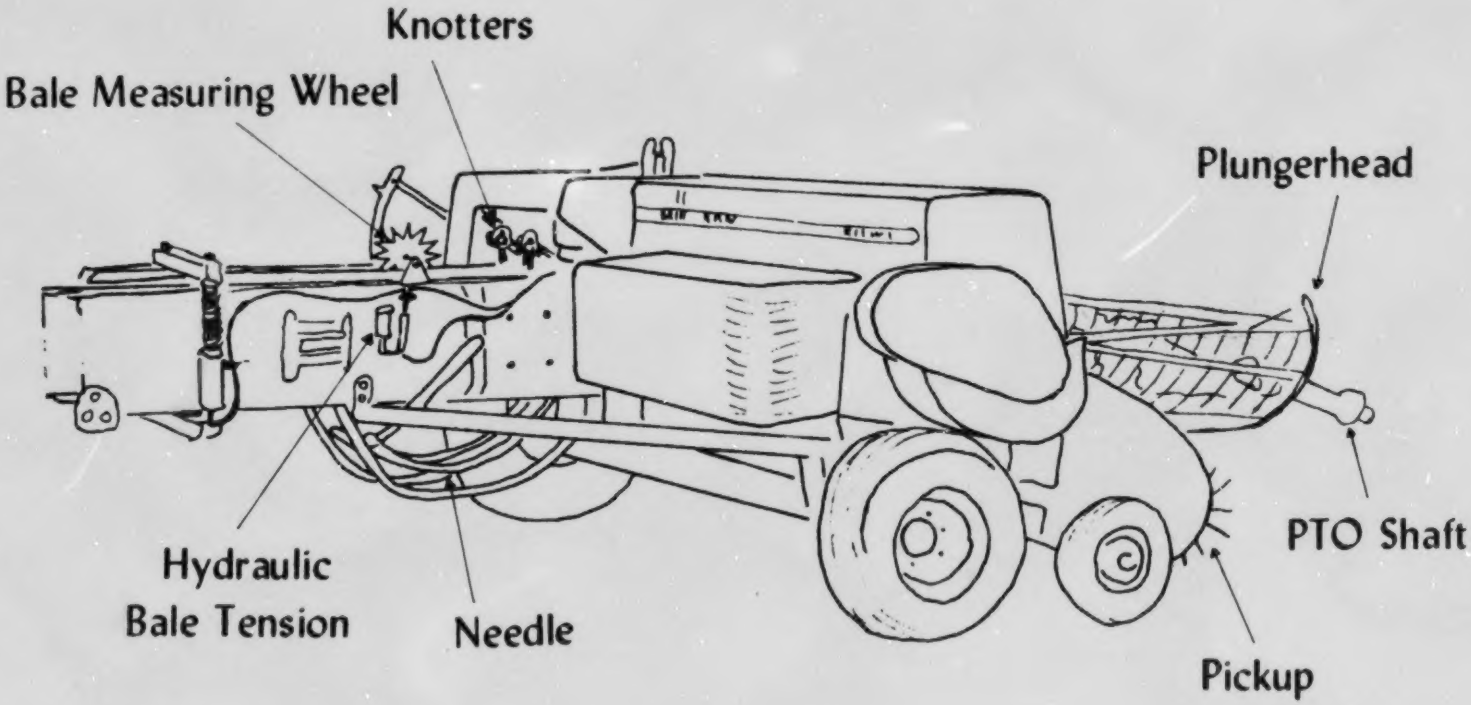
7. Obtain manufactures trouble shooting service manual for baler and become familiar with the knotter or twister operation and timing

   (NOTE: Always keep bale chamber stop lubricated and functionable. If it doesn't work and baler timing slips, then the plunger will bale up needles in bale chamber because stop will not cause shear bolts to break.)

Round Baler


Rear Gate
Bale Forming Belts
Bale Forming Chamber
PTO Shaft
Hydraulic Cylinders to Raise Rear Gates
Jackstand
Pickup

Square Baler


Knotters
Bale Measuring Wheel
Plungerhead
PTO Shaft
Hydraulic Bale Tension
Needle
Pickup

BALER OPERATION
UNIT XII

TEST

1. Match the following terms with the proper definition and place the correct number in the blank.

   a. ____Needle
   b.______Baler
   c.______Pickup
   d.______Press roll
   e.______Packerfinger (feeder)

   1. Roller on a round baler which is flat belt driven which flattens the hay.
   2. Mechanism on a square baler which knots twine
   3. Part of a baler which places the wire in position for the twister.
   4. Part of square bale which pick hay into bale chamber
   5. A machine used to compress hay into square or round bales using wire or twine to hold them together.
   6. Part of baler which gathers the hay out of the windrow

2. List four safety precautions associated with balers.

   a.

   b.

   c.

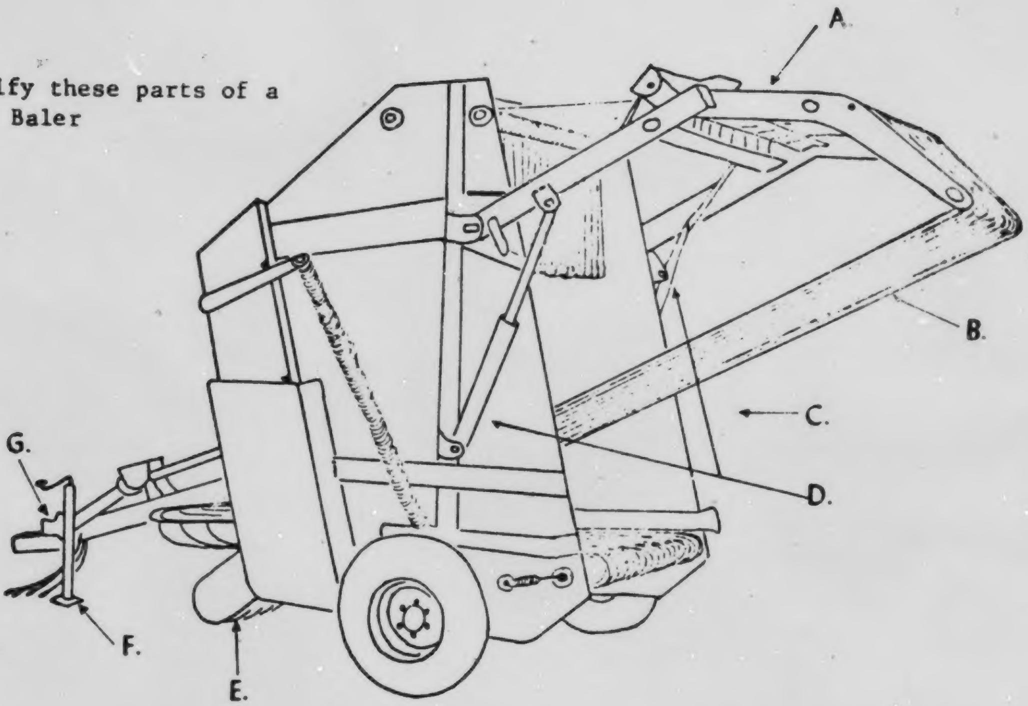
   d.

3. One should lubricate a square baler every_______bales and a round baler after______day(s)

4. Describe the operation of a round baler

5. Describe the operation of a square baler.

6. Identify these parts of a Round Baler



A. ____________________

B. ____________________

C. ____________________

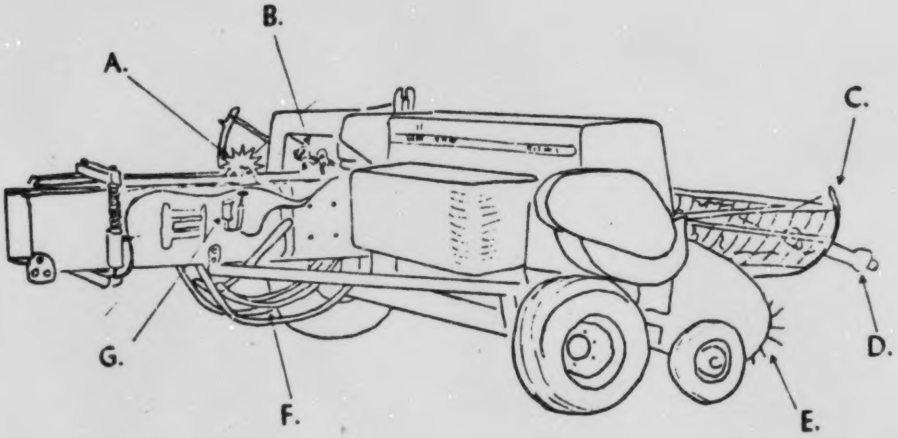
D. ____________________

E. ____________________

F. ____________________

G. ____________________

7. Identify these parts of a Square Baler



A.

B.

C.

D.

E.

F.

G.

BALER OPERATION
UNIT XII

ANSWERS TO TEST

1. a. 3
   b. 5
   c. 6
   d. 1
   e. 4

2. Any four below:

   a. Don't engage clutch until you are certain that everyone is clear of machine.

   b. Don't clean, lubricate, or make adjustments on baler while it is in motion.

   c. Don't work around baler in loose clothing.

   d. Don't try to pull loose hay from any part of baler while in operation.

   e. Don't operate baler without all shields in place.

3. 1000 Bales
   1 day

4. Written information should include:

   Pick-up operation
   Press Roll
   Lower band
   How hay is folded together
   How conveyor is stopped and needle is tripped

5. Written information should include:

   Pickup operation
   Auger Function
   Plunger Function
   Bale length measurement

6. a. Rear Gate

   b. Bale Forming Belts

   c. Bale Forming Chamber

   d. Hydraulic Cylinders to Raise Rear Gates

   e. Pickup

   f. Jackstand

   g. PTO Shaft

7. a. Bale Measuring Wheel
   b. Knotters
   c. Plungerhead
   d. PTO Shaft
   e. Pickup
   f. Needle
   g. Hydraulic Bale Tension

COMBINES
UNIT XIII

TERMINAL OBJECTIVES

After completion of Unit XIII, the student should be able to match terms associated with combines and identify the parts of a combine. The student should be able to match causes with poor combine harvesting operation and demonstrate preparation checking. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with combines
2. Identify the parts of a combine
3. List the 5 jobs the combine performs
4. Match the proper operation and adjustment to eliminate field losses.
5. List four factors that will affect combine harvesting
6. Demonstrate procedure for maintenance check of a combine
7. List the path material takes from cutter bar to straw spreader

COMBINES
UNIT XIII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and assignment sheets
3. Make transparencies
4. Discuss terminal and specific objective
5. Discuss information and assignment sheets
6. Plan field trip to equipment dealer
7. Give test

Students:

1. Read objectives
2. Study information and assignment sheets
3. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Suggested activities
3. Information sheets
4. Transparency master
    - TM 1 - Parts of a combine
5. Job sheet
    - #1 - Combine harvester maintenance
6. Assignment sheet
    - #1 - Path material takes from cutterbar
7. Answer to assignment sheet
8. Test
9. Answers to test

References:

1. Fundamentals of Machine Operation--Combine Harvesting, John Deere Service Publications Dept. F, John Deere Road, Moline Illinois 61265.

2. Hunt, Donnell, Farm Power and Machinery Management, Fifth ed., Iowa State University Press, Ames, Iowa.

COMBINES
UNIT XIII

INFORMATION SHEET

I. Combine terms

- A. Level-land combine--combine supported by a fixed drive axle. Separator tilts with the contour of the ground
- B. Hillside combine--combine is supported by pivoting axles which adjust to changing slopes hillsides.
- C. Pull-type combine--combine is drawn by a tractor
- D. Bat-type or slot-type reel--consists of three to eight slots made of wood or steel
- E. Pickup reel--has several steel tines or fingers attached to the slots

II. Parts of a combine (Transparency 1)

III. Combines perform the following basic crop harvesting functions

- A. Cutting and feeding
- B. Threshing
- C. Separating
- D. Cleaning
- E. Handling

IV. Factors which affect combine harvesting

- A. Skill of the operator
- B. Condition of the crop and field
- C. Adjustment of the combine
- D. Proper operating speed of harvesting components
- E. Ground speed of the combine
- F. Width of the header

V. Path material takes from cutterbar to straw spreader (Assignment Sheet #1)

VI. Maintenance check of a combine (Job Sheet #1)

VII. Signs of poor combine harvesting

- A. High cutterbar loss

INFORMATION SHEET

B. High cylinder loss

C. High rack loss

D. High show loss

E. Poorly cleaned grain

F. Cracked grain

G. Cylinder wrappings

INFORMATION SHEET

GUIDE FOR TEACHING: Maintenance & Repair of Combine

PROBLEM: Trouble Shooting, Cause, Remedy Check Sheet

Trouble	Probable Cause	Remedy	Method for Checking
High Cutterbar Loss	Heads left standing	Lower cutterbar to cut low-growing or lodged crops.	1. Count the number of kernels per sq. ft. on the ground under the combine
	Reel Shattering grain	Decrease reel speed by changing sprokets.	2. Count the number of kernels in standing grain per sq. ft. (Not cutterbar losses, but shattered grain.)
	Reel throwing out grain	Raise reel. Fill in from reel slat toward center of reel with 1/4" mesh hardware cloth. Slow reel down.	3. Take difference between 1 and 2 for cutterbar loss.
	Grain not being laid back on platform canvas	Move reel back and down. Add pieces of belt to reel slat to brush cutterbar.	
	Tangling of grain, vines and weeds on outer ends of the slates	Unite the outer ends of the slates with an 8" band of sheet iron and slow down the reel.	
High Cylinder Loss	Low cylinder speed	Increase cylinder speed until you just begin to get a little breaking of straw.	1. Catch all material leaving back end of combine in a box or canvas.
	Too much clearance between cylinder and concaves	Decrease cylinder-concave clearance until occasionally a kernel will be found in the head.	2. Count unthreshed kernels in heads of this material
	Crop too wet	Wait until grain is about 13% moisture.	3. Determine the number of kernels/sq. ft. of area taken.

INFORMATION SHEET

Trouble	Probable Cause	Remedy	Method for Checking
High Rack Loss	Rack speed too high or too low	Set PTO to manual's recommendation Set rack to manual's recommendation	1. Catch all material coming out back end of machine in a tray 24" x 60" or a canvas for about 10' forward travel
	Overloading	Raise cutterbar, reduce rate of travel, and/or avoid overthreshing by increasing cylinder-concave clearance.	2. Shake loose grain out of straw
	Breaking up material too much with cylinder (Overthreshing)	Increase cylinder-concave clearance until little or no breaking. Decrease the cylinder speed slightly	3. Determine number of kernels per sq. ft. of acre taken
	Rack openings plugged	Clean rack openings. Reduce rate of travel. Avoid overloading.	4. Check table. Should have less than 0.4% of total yield
High Shoe Loss	Overloading the shoe (Overthreshing)	Increase cylinder-concave clearance Decrease cylinder speed. Reduce rate of trvel. Raise cutterbar. Do only one at a time until you get loss to 3-4 kernels per sq. ft. of area taken.	1. Catch only material from the shoe in tray. (Use a canvas to keep rack straw off.) On some machines you may have to subtract rack loss from total loss.
	Shoe speed too high or too low	Check PTO speed with operator's manual.	2. Determine number of kernels/ sq. ft. area.
	Improperly directed wind blast	Change wind blast to keep chaffy material "floating" to rear.	3. Check table same as for rack.
	Too must wind blast	Reduce wind blast to where only a small amount of chaffy material appears in grain rack.	

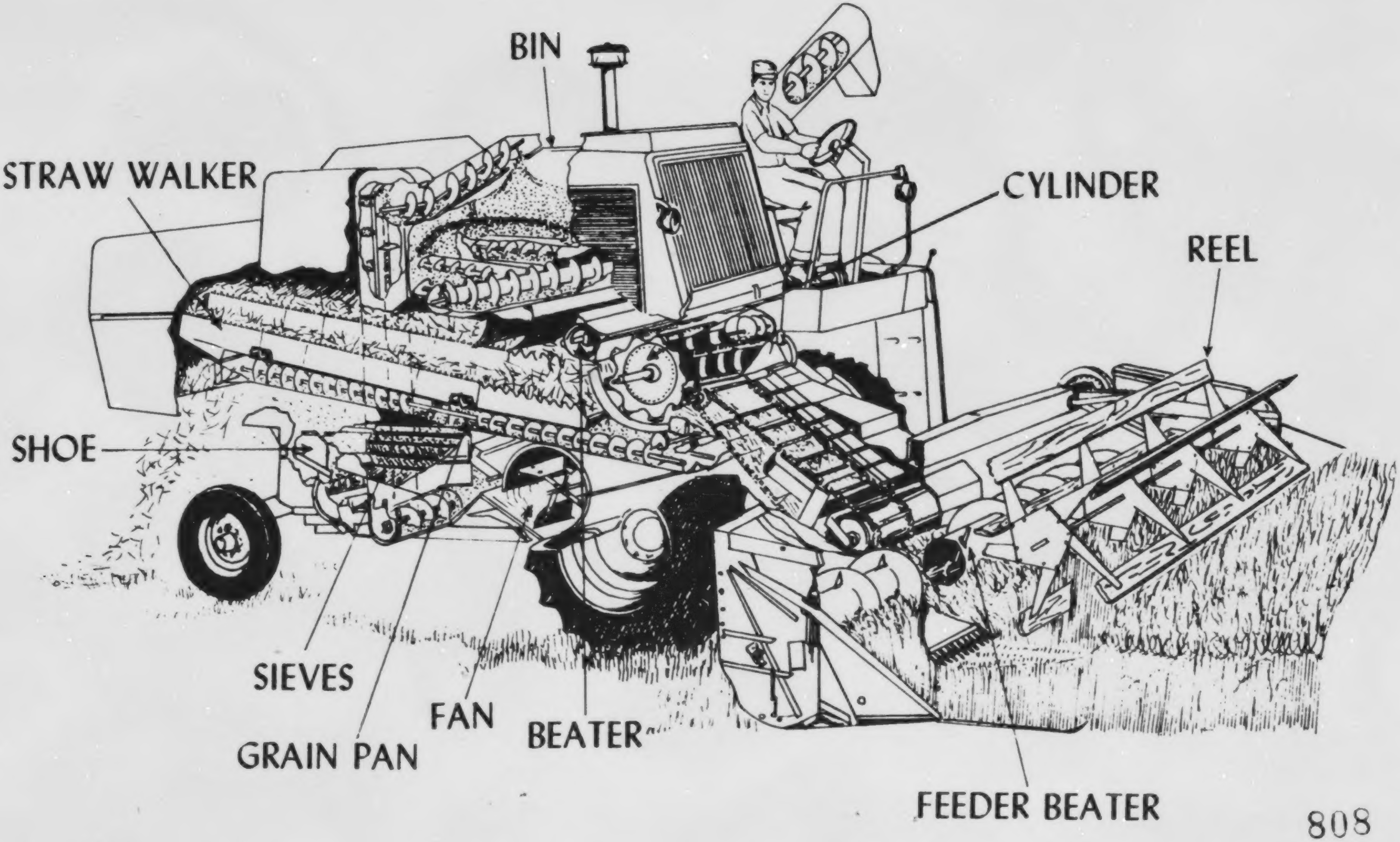
INFORMATION SHEET

Trouble	Probable Cause	Remedy	Method for Checking
High Shoe Loss (Cont.)	Sieve openings closed too much	Open chaffer or upper sieve until about 0.4% of total yield is passing onto ground.	
	Sieve openings plugged	Clean the sieves. Change air blast to keep chaff floating.	
Poorly Cleaned Grain	Overthreshing	Increase cylinder-concave clearance until little straw breaking and a few unthreshed kernels found over the rack.	1. Observe the grain in the grain tank for chaff and foreign materials 2. Check tailings for large amounts of grain
	Overloading	Reduce rate of travel, raise cutter-bar or cut a narrower swath particularly on PTO machine	
	Sieve open too much	Close lower sieve on notch.	1. Large amounts of heavy dirt in grain
	Insufficient wind blast	Increase the wind blast one notch and direct it toward the forward end of the sieves.	1. Chaff matts on sieves 2. Poor separation
Cracked Grain	Too little cylinder-concave clearance	Increase cylinder-concave clearance until little or no cracked kernels appear and cylinder losses are not excessive.	1. Observe grain in tank for cracked kernels
	High cylinder speed	Reduce to manual recommended speed	1. Check with tachometer under no load
	Too much grain returned to cylinder in the tailings	Open the lower sieve slightly	

INFORMATION SHEET

Trouble	Probable Cause	Remedy	Method for Checking
Cracked Grain (Cont.)	Loose elevator chains	Take up slack in elevator chains	1. Check grain before entering elevator against grain in the tank
	Shelling plate too close	Increase the clearance until little or no cracked kernels appear.	
Cylinder Wrappings	Grain tough, damp, or heavy growth of weeds	Increase the cylinder speed slightly, increase the beater speed slightly, reduce rate of travel or raise cutterbar	1. Check Cylinder
	Stripping bar too far from cylinder	Adjust stripping bar just close enough to prevent wrapping.	

Combine


BIN
STRAW WALKER
CYLINDER
REEL
SHOE
SIEVES
FAN
BEATER
GRAIN PAN
FEEDER BEATER

COMBINES
UNIT XIII

ASSIGNMENT SHEET #1--PATH MATERIAL TAKES FROM CUTTERBAR

List the path each material takes from cutter bar to straw spreader or grain tank by placing parts of combine selected under each material in proper order.

Materials — Parts of Combine

Tailings　Straw　Clean Grain　Chaff

Reel
Cutter
Auger
Feeder Conveyer
Cylinder
Concave
Rotary Deflector
Straw Walker
Grain Auger
Chaffer
Sieve
Tail elevator
Straw Spreader

COMBINES
UNIT XIII

ANSWERS TO ASSIGNMENT SHEET #1

Path material takes from cutter bar to straw spreader or grain tank

Tailings	Straw	Clean Grain	Chaff
Reel	Reel	Reel	Reel
Cutter	Cutter	Cutter	Cutter
Auger	Auger	Auter	Auger
Feeder Conveyer	Feeder Conveyer	Feeder Conveyer	Feeder Conveyer
Cylinder	Cylinder	Cylinder	Cylinder
Concave	Concave	Concave	Concave
Rotary deflection	Rotary deflection	Rotary deflection	Rotary deflection
Straw Walker	Straw Walker	Straw Walker	Straw Walker
Grain Auger	Straw Spreader	Grain Auger	Grain Auger
Chaffer		Chaffer	Chaffer
Sieve		Sieve	Sieve
Tailer elevator		Clean Grain Elevator	Straw Spreader
Cylinder		Grain Tanks	

COMBINES
UNIT XIII

JOB SHEET #1--MAINTENANCE CHECK LIST

COMBINE HARVESTER-THRESHER

MANUFACTURER____________________ YEAR______________
NAME____________________ SERIAL NO.______________
TYPE____________________ MODEL NO.______________
Estimated Value of Machine When Received__________
Estimated Value of Reconditioned Machine__________

REPAIR

Check each part carefully and make notation of conditions such as loose, worn, bent, cracked, broken, missing, dirt, rust, frozen, etc.

A. PLATFORM	Condition as Found	Part Required		How Corrected? (Replaced, Straight-ended, welded, etc.	
		Part Number	Cost		Cost
1. Guards					
2. Ledger plates					
3. Wearing plates					
4. Knife clips					
5. Knife Sections					
6. Pitman chaft					
7. Pitman bearings					
8. Pitman drive chain or belt					
9. Pitman drive idler					
10. Auger bearings or canvas					
11. Auger chain or belt					
12. Auger drive idler					
13. Reel batts					
14. Reel bearings					
15. Reel chain idler					
16. Platform lift supports					
17. Lift mechanism					
18. Feeder raddle					
19. Feeder idler bearings					
20. Feeder drive shaft bearings					
21. Reel slip clutch					
22.					
23.					
B. THRESHER					
1. Front beater					
2. Front beater shaft bearings					
3. Front beat idler					
4. Cylinder rasp bars					
5. Belt, cylinder					
6. Belt idler					
7. Grate bars (concave)					
8. Cylinder shaft bearings					
9. Rear Beater					
10. Beater grate					
11. Idler, rear beater					
12. Rear beater shaft bearings					

JOB SHEET #1

B. THRESHER (Continued)	Condition as Found	Part Required		How Corrected? (Replaced, Straightened, welded, etc.	
		Part Number	Cost		Cost
13. Return elevator shaft bearings					
14. Return elevator chain and flites					
15. Return elevator auger shaft bearings					
16. Upper return elevator idler bearings					
17.					
18.					
C. SEPARATOR					
1. Separator check flap					
2. Grain pan					
3. Grain pan front augers					
4. Chaffer					
5. Chaffer extension					
6. Lower sieve					
7. Straw walker					
8. Straw walker bearings					
9. Straw walker crank bearings					
10. Rear hanger bearings					
11. Grain pan shaker pitman					
12. Grain pan shaker bearings					
13. Pan shaft bearings					
14. Fan housing					
15. Fan batts					
16. Straw spreader					
17. Spreader belt					
18. Belt idler					
19. Bearings					
20.					
21.					
D. BIN ELEVATOR					
1. Chain and flites					
2. Bin elevator chain idler					
3. Upper bin elevator bearings					
4. Lower bin of elevator bearings					
5. Grain bin auger bearings					
6. Grain bin auger drive belt					
7. Grain bin auger belt idler					
8.					
9.					
10.					

JOB SHEET #1

E. DRIVE	Condition as Found	Part Required		How Corrected? (Replaced, Straightened, welded, etc.	
		Part Number	Cost		Cost
1. Wheel bearings					
2. Variable speed					
3. Brakes					
4. Differential					
5. Tires					
6. Universal joints					
7. Drive chain or belt					
8. Transfer cases					
9.					
10.					
	Total Repair Costs				

II. ADJUSTMENT

A. PLATFORM	Adjustment as Found	Recommended in Operator Manual	Corrected (Yes, No)
1. Register			
2. Auger clearance			
3. Reel clearance			
4. Reel batts			
5. Reel chain drive			
6. Reel chain idler			
7. Feeder chain			
8.			
B. THRESHER			
1. Cylinder rasp bars			
2. Cylinder belt idler			
3. Rear beater belt			
4. Upper return elevator chain idler			
5.			
6.			
C. SEPARATOR			
1. Separator check flap			
2. Grain pan front hangers			
3. Chaffer			
4. Chaffer extension			
5. Lower sieve			
6. Rear hanger bushings			
7. Grain pan shaker pitman			
8. Pan			
9. Tail gate deflector			
10. Bin elevator chain			
11. Bin elevator chain oiler			
12. Grain bin auger belt idler			
13.			

JOB SHEET #1

III. LUBRICATION

	APPROVED LUBRICANT	HOW MUCH LUBRICANT	HOW OFTEN TO LUBRICATE
A. PLATFORM			
1. Pitman			
2. Auger bearings			
3. Reel bearings			
4. Platform lift brackets			
5. Feeder chain idler			
6. Feeder chain drive shaft bearings			
7.			
B. THRESHER			
1. Front beater shaft bearings			
2. Cylinder shaft bearings			
3. Rear beater idler			
4. Rear beater shaft bearings			
5. Upper elevator bearings			
6. Lower elevator bearings			
7. Chain idler bearing			
8. Upper auger bearings			
9. Lower idler bearings			
10.			
C. SEPARATOR			
1. Grain pan front hangers			
2. Straw walker crank bearings			
3. Rear hanger bearings			
4. Grain pan shaker bearings			
5. Fan shaft bearings			
6. Straw spreader belt idler bearings			
7. Straw spreader bearing			
8. Upper bin elevator bearings			
9. Grain bin auger bearings			
10.			
D. DRIVE			
1. Wheel bearings			
2. Brakes			
3. U joints			
4. Drive shafts			
5. Variable speed			
6. Differential			
7.			
8.			

Total Student Hours To Recondition Machine ____________

COMBINES
UNIT XIII

TEST

1. Match the terms on the right to the proper definition.

_____a. Combine supported by a fixed drive axle.

_____b. Combine is supported by pivoting axles.

_____c. 3 to 8 slots made of wood or steel.

_____d. Has several steel times or fingers attached to the slots

_____e. Combine is drawn by a tractor.

1. Pick-up reel
2. Level-land combine
3. Bot type or slot-type reel
4. Hilloide combine
5. Pull-type combine

2. List the five jobs a combine performs

a.

b.

c.

d.

e.

3. Match probable cause with trouble one may have

Trouble

_____a. High cutterbar loss

_____b. High cylinder loss

_____c. High reels loss

_____d. High sieve loss

_____e. Cracked grain

_____f. Cylinder wrapping

_____g. Poorly cleaned grain

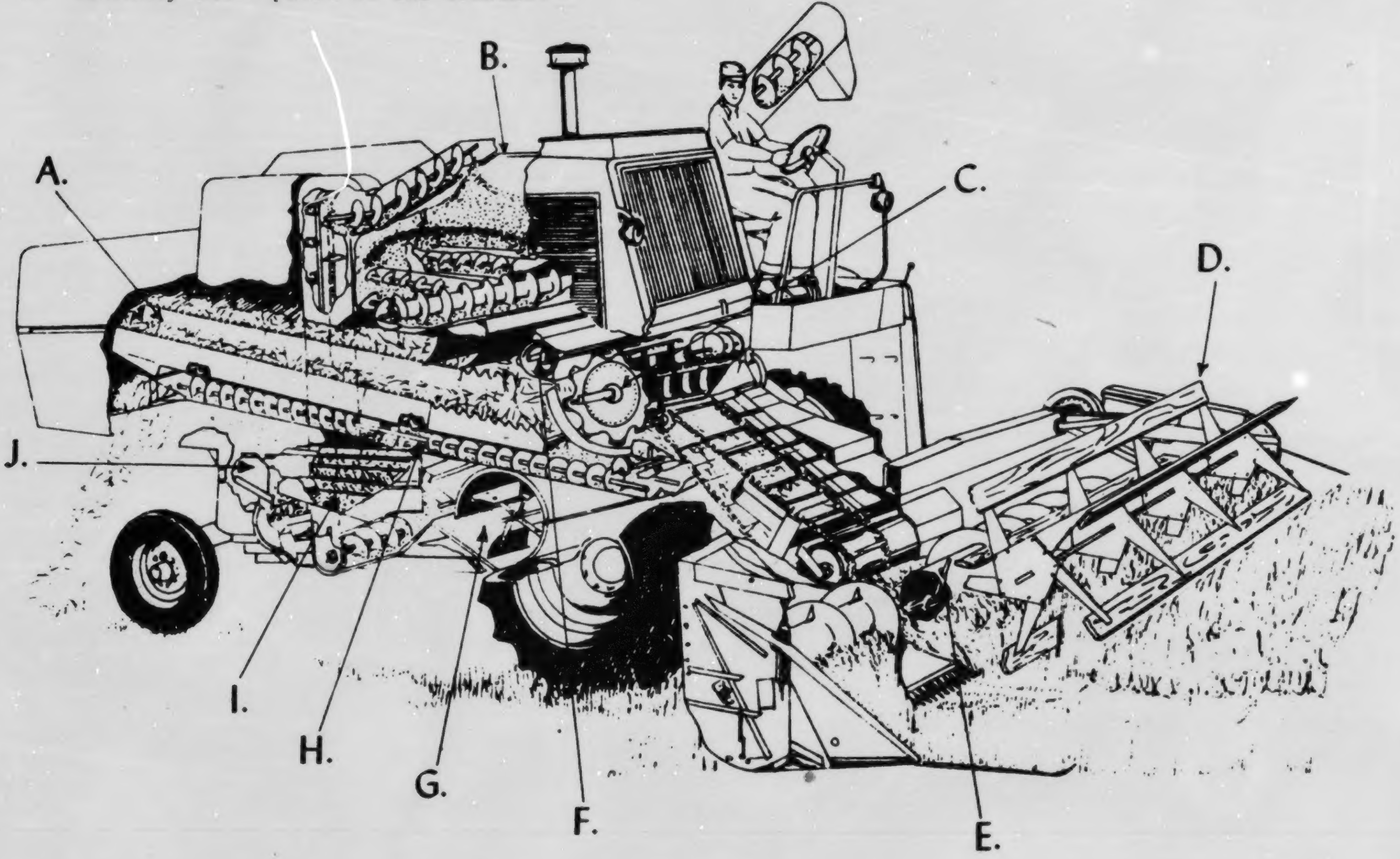
Cause (May be used more than once)

1. Low cylinder speed
2. Crop throwing out grain
3. Reel throwing out grain
4. Overloading
5. Shoe speed too high
6. High cylinder speed
7. Loose elevator chains
8. Heavy growth of weeds
9. Reel shattering grain
10. Rack openings plugged
11. Too much wind blast
12. Sieve open too much

4. List four factors which affect combine harvesting.

a.
b.
c.
d.

5. Identify these parts of the Combine.


A.
B.
C.
D.
J.
I.
H.
G.
F.
E.

E.

F.

G.

H.

I.

J.

COMBINES
UNIT XIII

ANSWERS TO TEST

1. a. 2
   b. 4
   c. 3
   d. 1
   e. 5

2. a. Separating
   b. Cleaning
   c. Handling
   d. Cutting and feeding
   e. Threshing

3. a. 3,9
   b. 2,1
   c. 4,10
   d. 5,11
   e. 6,7
   f. 8
   g. 12

4. Skill of the operator
   Condition of the crop and field
   Adjustment of the combine
   Proper operating speed of harvesting components
   Ground speed of the combine
   Width of the header

5. a. Straw Walker
   b. Bin
   c. Cylinder
   d. Reel
   e. Feeder Beater
   f. Beater
   g. Fan
   h. Grain Pan
   I. Sieves
   j. Shol

CAST IRON WELDING
UNIT XIV

TERMINAL OBJECTIVES

After completion of Unit XIV, the student should be able to identify the three common types of cast iron and relate these to their uses. He will be able to demonstrate proficiency in welding cast iron using machinable and non-machinable arc welding electrodes, and braze welding cast iron with the oxyacetylene equipment. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Identify the 3 common types of cast iron by their shape, surface appearance, spark test or fracture surface appearance.
2. Explain why cast iron is difficult to weld.
3. Identify machinable and non-machinable cast electrodes and explain when each is used.
4. Explain two techniques used in cast iron welding to prevent re-cracking or breaking as the weld cools.
5. Identify cast welds made with too little heat, too much heat and improper arc length.
6. Demonstrate to the instructors indicated level of proficiency, the ability to repair a broken casting using machinable electrodes.
7. Demonstrate to the instructors indicated level of proficiency, the ability to repair a broken casting using non-machinable electrodes.
8. Demonstrate to the instructors indicated level of proficiency, the ability to repair a broken casting using braze welding.

CAST IRON WELDING
UNIT XIV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make or acquire samples of the following:
    a. Common type of cast by shape, surface appearance and fracture surface
    b. Machinable and non-machinable electrodes
    c. Weld made with too much heat
    d. Weld made with too little heat
    e. Weld made with correct heat
    f. Welds made with too long and too short an arc
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in the job sheets
7. Give test

Students:

1. Read objectives
2. Study information sheets
3. Demonstrate ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Terminal and specific objectives
2. Information sheets
3. Job sheets
    #1--Repairing Castings Using Machinable Arc Electrodes
    #2--Repairing Castings Using Non-machinable Arc Electrodes
    #3--Repairing Castings Using Oxyacetylene Brazing Method
4. Test
5. Answers to test

References:

1. Kugler, Harold L., Arc Welding Lessons, Cleveland, Ohio: James F. Lincoln Arc Welding Foundation.

2. Wakeman, McCoy, The Farm Shop, New York, N.Y., The MacMillian Co.

3. Filmstrip--"Cast Iron Welding"--Cleveland, Ohio: Lincoln Arc Welding Foundation

CAST IRON WELDING
UNIT XIV

INFORMATION SHEET

I. Introductory Information Related to Cast Iron

A. All kinds of cast iron have the same basic raw material used in their manufacture:

1. Pit Iron
2. Carbon
3. Silicon
4. Sulphur
5. Phosphorous
6. Manganese

B. Three kinds of cast iron are:

1. Gray cast--cooled slowly, result in less combined carbon
   a. Used in engine blocks, manifolds, sproket and machine parts
   b. Identified by:
      1. Fracture Appearance--dark gray color that rubs off black
      2. Surface Appearance--shows evidence of sand mold. Color is dark gray
      3. Spark Test--color red coming from wheel and changing to straw yellow. Average stream length is 25 inches with small volume and many sprigs that are small and repeating. (NOTE: Lincoln Arc Welding filmstrips include pictures of this.)
2. White cast--cooled quickly, causing a metal that is more brittle, but has an extremely hard surface
   a. Examples of white cast are mill burr plates, grain drill disc bearings and feed grinder breaker core
   b. Identified by:
      1. Fracture Appearance--very fine silvery white crystalline formation
      2. Surface Appearance--evidences of sand mold. Color--dark gray
      3. Spark Test--color red coming off wheel is red changing to straw yellow. Average stream length is 20 inches with very small volume. Sprigs finer than gray cast, small and repeating.

INFORMATION SHEET

3. Malleable iron--formed by annealing white cast iron

   a. Examples of use are mower guards, knife clips, and cultivator shanks

   b. Identified by:

      1. Fracture Appearance--dark gray except for light outer layer

      2. Surface Appearance--evidence of sand mold Color--dark gray

      3. Spark Test--color straw yellow. Average stream length is 30 inches. Volume is moderate, with longer shafts than gray iron ending in numerous small, repeating sprigs

II. Weldability of Cast Iron--factors affecting weldability

A. Temperature of welding--above 1650 degrees F. causes chemical alteration

B. Surface skin--needs to be ground off

C. Rate weld is cooled--must be slow to prevent formation of white cast in weld fringe

D. Surface cleanliness--remove grease, dirt, rust and paint.

E. Interior cleanliness--preheat to 750 degrees F. to drive out oil

F. Thickness--vee out if over 3/16 inches

G. Cracks continue from heat of welding drill hole at end of crack

III. Special Considerations in Welding Cast Iron

A. Techniques to prevent cracking or recracking during welding with arc welder

   1. Preheating--whole casting be kept at least 500 degrees F. during welding and cooled slowly and uniformly

   2. Backstep method--keep casting at minimum heat. Weld 3/8 inch to 1/2 inch beads. Allow casting to cool until it can be touched. Then weld next segment

   3. Control cooling rate--use slow and uniform rate. Bury in ashes

B. Two types of electrodes for cast arc welding

INFORMATION SHEET

1. Machinable--AWS classification ENI. Has high nickle content and can be filed or ground to desired shape

2. Non-machinable--AWS classification EST. Has mild steel core and shaping by grinding or filing is not recommended

3. Factors effecting choice of cast arc welding electrode

    a. cost--machinable electrodes cost 4-10 times more than non-machinable

    b. surface needed

    c. strength--non-machinable is stronger

    d. welding temperature--non-machinable requires higher welding amperage

C. Common methods of welding cast iron with the oxyacetylene equipment

1. Brazing--very satisfactory method

    a. Low temperature application--reduces cracking problems

    b. Braze material will stretch and reduce stresses during cooling

    c. Is machinable

    (NOTE: cannot be used if temperature where part is used will exceed 500 degrees F.)

2. Cast-iron rod--use when temperature of use exceeds 500 degrees F.

IV. Weld Appearances as Related to Welding Techniques

A. Arc
Too hot--cracking sound of arc, flatten weld, bubbles appear
Too cold--poor fusion, rough
Arc length too long--flattened weld, poor penetration
Arc length too short--rough, narrow weld

B. Gas
Too hot--cracking problems
Too cold--poor fusion, lack of weld depth
(NOTE: See sample prepared by instructors.)

CAST IRON WELDING
UNIT XIV

JOB SHEET #1--REPAIRING CASTINGS USING MACHINABLE ARC ELECTRODES

I. Tools and Equipment

A. Arc welding unit

B. Gloves, helmet, safety glasses

C. Chipping hammer

D. Wire brush

E. Pliers, clamps

II. Materials

A. Pieces of broken casting--size large enough to allow for a 3 inch weld, 3/16 to 1/4 inches thick

B. ENI or similar machinable 1/8 inch electrodes

III. Procedure

A. Prepare pieces of cast--

1. Vee joint to produce 60 degrees included angle

2. Leave 1/16 to 3/32 inches unground at the bottom of vee to allow for fit up

3. Grind casting skin off along vee edge

4. Clamp or tack weld in desired position

5. Preheat to dull red heat

B. Use trial amperage setting 100 amps--adjust to get desired results

C. Weld the joint--with single pass stringer bead

1. Using slightly longer than normal arc length

2. Using 5-10 degrees electrode to casting angle in direction of travel

3. Position electrode to get equal fusion on both sides of joint

D. Chip and brush clean

E. Allow to cool, evaluate your work, turn in for evaluation or grading, or do exercise again until satisfied.

CAST IRON WELDING
UNIT XIV

JOB SHEET #2--REPAIRING CASTINGS USING NON-MACHINABLE ARC ELECTRODES

I. Tools and Equipment

- A. Arc welding unit
- B. Gloves, helmet, safety glasses
- C. Chipping hammer
- D. Wire brush
- E. Pliers, clamps

II. Materials

- A. Pieces of broken casting--large enough to allow for 3 inch weld, 3/16 to 1/4 inches thick
- B. EST or similar non-machinable 1/8 inch electrodes

III. Procedure

- A. Prepare pieces of cast--
  - 1. Vee joint to produce 60 degrees included angle
  - 2. Leave 1/16 to 3/32 inches unground at the bottom of vee to allow for fit up
  - 3. Grind casting skin off along vee edge
  - 4. Clamp or tack weld in desired position
  - 5. Preheat to dull red heat
- B. Use trial amperage setting 100 amps--adjust to get desired results
- C. Weld the joint--with single pass stringer bead
  - 1. Using slightly longer than normal arc length
  - 2. Using 5-10 degrees electrode to casting angle in direction of travel
  - 3. Position electrode to get equal fusion on both sides of joint
- D. Chip and brush clean
- E. Allow to cool, evaluate your work, turn in for evaluation or grading, or do exercise again until satisfied.

CAST IRON WELDING
UNIT XIV

JOB SHEET #3--REPAIRING CASTINGS USING OXYACETYLENE BRAZING METHOD

I. Tools and Equipment

- A. Oxyacetylene welding unit and welding table
- B. Welding tip--see chart by manufacturers for size
- C. Gloves
- D. Welding goggles with no. 5 lense and safety glasses
- E. Pliers and clamps
- F. Wire brush
- G. Friction lighter

II. Materials

- A. Pieces of broken casting--large enough size to allow for a 3 inch weld, 3/16 to 1/4 inches thick
- B. 3/32 inch brazing rod
- C. Brazing flux

III. Procedure

- A. Prepare pieces of cast--
  1. Vee joint to produce 60 degreed included angle
  2. Leave 1/16 to 3/32 inches unground at the bottom of vee to allow for fit up
  3. Grind casting skin off along vee edge
  4. Clamp or tack weld in desired position
  5. Preheat to dull red heat
- B. Weld the joint using the standard brazing procedures learned in previous lessons. (Take care not to overheat.)
- C. Cool slowly (do not put in water).
- D. Evaluate your work, turn in for a grade or do over until satisfactory

CAST IRON WELDING
UNIT XIV

TEST

1. Identify the five samples of cast iron indicating if they are (a) white cast, (b) gray cast, (c) malleable cast

______Sample 1
______Sample 2
______Sample 3
______Sample 4
______Sample 5

2. Cast iron is difficult to weld because: (choose the 3 best reasons from those given)

   a. Surface skin is resistant to welding heat
   b. Welding temperature over 1650 degrees cause chemical change in base metal
   c. Cast iron requires extremely high weld heats
   d. Cast is porous and may contain oil
   e. Cast requires special welders

______Best choice
______Best choice
______Best choice

3. Identify the electrode samples as being machinable or non-machinable

______Sample 1
______Sample 2

4. Explain two techniques of arc welding that can be used to prevent re-cracking of castings as the weld cools

   a.

   b.

5. Identify the sample cast welds as to welding problem and match them with corrective method needed

______Increase welding heat
______Decrease welding heat
______Shorten arc length
______Increase arc length

6. Demonstrate the ability to:

   a. Weld a casting with machinable electrodes
   b. Weld a casting with non-machinable elctrodes
   c. Weld a casting using the oxyacetylene brazing

CAST IRON WELDING
UNIT XIV

ANSWERS TO TEST

1. Samples determined by instructor

2. __a__Best choice
   __b__Best choice
   __d__Best choice

3. Samples determined by instructor

4. a. Preheat casting to 500 degrees F. or dull red heat and cool slowly by burying in ashes

   b. Use backstep method and cool slowly by burying in ashes

5. Samples determined by instructor

6. Performance tests to be graded by instructor

HARDFACING (HARDSURFACING)
UNIT XV

TERMINAL OBJECTIVES

After completion of Unit XV, the student should be able to define terms associated with hardfacing. He should be able to explain the types of wear and relate them to common conditions where they occur. He should be able to discuss the economic values of using hardfacing practices. He should be able to demonstrate the approved techniques of applying hardfacing material to common farm tools and equipment using the arc or gas welding techniques. This knowledge will be evidenced by demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define five terms commonly associated with the application of hardfacing materials
2. Describe four types of wear
3. Associate the types of wear with the common work condition in which they occur
4. Name the economic values common to hardfacing farm equipment
5. Demonstrate to the instructors indicated level of proficiency, the ability to apply hardfacing material to mild steel using the arc welder
6. Demonstrate to the instructors indicated level of proficiency, the ability to apply hardfacing material to mild steel using the oxyacetylene equipment.

HARDFACING (HARDSURFACING)
UNIT XV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparency
4. Discuss terminal and specific objectives
5. Discuss information sheets
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Student:

1. Read objectives
2. Study information sheet
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Transparency master
   TM 1--Acetylene welding flames
4. Job sheets
   #1--Application of hardfacing materials using the arc welder
   #2--Application of hardfacing materials using the oxyacetylene welder
5. Test
6. Answers to test

References:

1. Giachino, J.W.; Weeko, William; Brune, Elmer; Welding--Skills and Practices, American Technical Society, Chicago, Ill.

2. Fundamentals of Service--Welding, John Deere Service Publications, John Deere Road, Moline, Illinois 61265.

HARDFACING (HARDSURFACING)
UNIT XV

INFORMATION SHEET

I. Terms and definitions

A. "Brinell"--test indicating the metal hardness

B. Carbonizing flame--oxyacetylene flame containing excessive acetylene gas. Used for hardfacing.

C. Hardfacing--the application of a surface coating of metal to a tool surface which is resistant to wear

D. Rockwell--test indicating the metal hardness

E. Stellite--"trade name" of one of the common hardfacing materials

F. Stoody-- "trade name" of one of the common hardfacing materials

G. Sweating--term indicates the proper plate temperature for hardfacing with oxyactylene torch. Surface appears as a damp or sweaty condition and plate is just turning to red color.

H. Workhardening--characteristic of certain types of metal that allows the surface of the material to become harder as it is subjected to abrasion

II. Economic value of hardfacing

A. Increases the time available for work

B. Reduced maintenance time and labor

C. Reduced cost of repair parts

III. Common types of wear

A. Impact--small particles are removed by shock of contact between tool and hard objects

B. Abrasion--wear caused by contact with a sandy or granular materials

C. Friction--wear caused by metal to metal contact

D. Chemical--wear caused by reaction to certain chemical in the environment

IV. Common types of materials used in hardfacing

A. Base materials--the carrier material to which the hardfacing materials are added

INFORMATION SHEET

1. Cobalt--used as base for chromium and tungsten alloys. Gives resistance to abrasion, oxidation, and impact. Good resistance to frictional wear

2. Nickel--low temperature application for metal to metal wear. Used temperature must not exceed 1000 degrees F.

3. Iron--used as base for chromium materials. Provides resistance to both impact and abrasion

B. Common hardening materials

1. Chromium--alloying material

2. Tungsten (Tungsten Carbide)--hard particles which are imbedded in a matrix

3. Vandium--alloying material

4. Molybdeum--alloying material

C. Material used as a matrix--use as agent to hold tungsten--carbide particles in place.

1. Steel

2. Bronze

3. Nickle

4. Cobalt

V. Relating types of hardfacing materials to types of wear.

TYPE MATERIAL	KEY POINT RELATED TO USE
A. Impact--Abrasion Resistant	1. Work Hardening--provide hard surface to resist abrasion and tough interior. 2. Used on soil working tools 3. Used in thin layers
B. High Abrasion Resistance	1. Extremely hard and brittle material 2. Subject to impact damage 3. Best applied in a thin coat on one side of tools cutting edge
C. Tool steel and Build-up Materials	1. Provide moderate abrasion and impact resistance 2. Hard with great strength 3. Can be forged and shaped 4. Can be hardened and tempered

INFORMATION SHEET

VI. Forms of hardfacing materials

- A. Electrodes
- B. Powder
- C. Cost rod
- D. Tube rod
- E. Wire

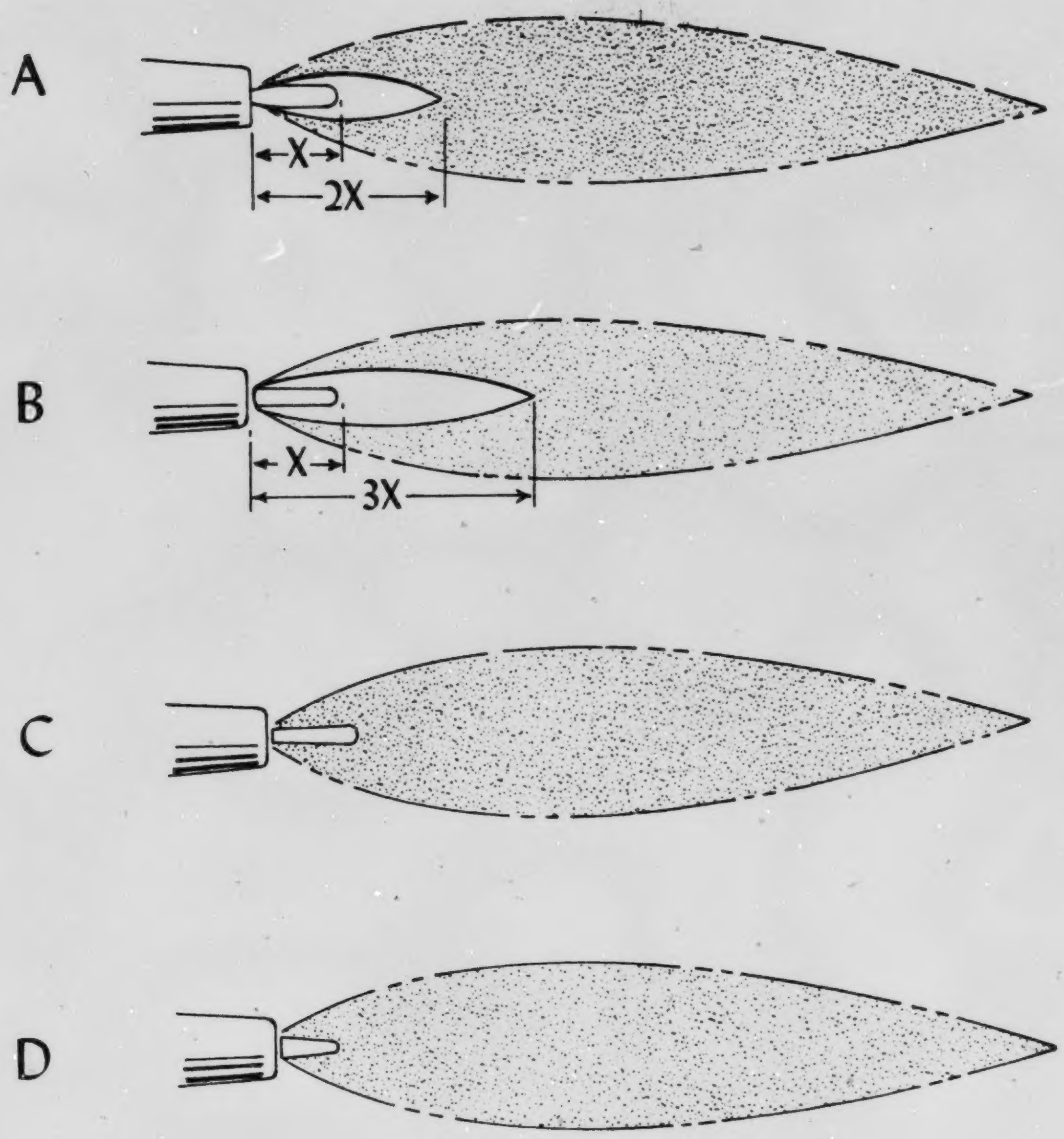
VII. Preparing the tool for hardfacing

- A. Grins surface clean
- B. Leave no sharp edges or corners
- C. Position as level as possible
- D. Preheat to 800 degrees F. (dull red)

VIII. Application of hardfacing using the arc welder (Job Sheet #1)

IX. Application of hardfacing using the oxyacetylene welder. (Job Sheet #2)

ACETYLENE WELDING FLAMES


A
X
2X
B
X
3X
C
D

A and B - CARBONIZING C - NEUTRAL D - OXIDIZING

HARDFACING (Hardsurfacing)
UNIT XV

JOB SHEET #1 - APPLICATION OF HARDFACING MATERIAL USING THE ARC WELDER

Demonstrate your ability to apply hardfacing material using the arc welder. Follow the instructions given below.

I. Tools, Equipment, and Materials needed

  A. Arc welder and related accessory equipment.

  B. Hardfacing electrode - (Instructor will supply)

  C. Scrap Mild Steel - 3/16" - 1/4" thick, 5" - 6" long, at least 2" wide.

II. Procedure

  A. Prepare scrap M.S. for hardfacing applications

    1. Grind to clean and bright condition.

    2. Round edges and corners.

    3. Sharpen similar to plow share edge.

  B. Position plate as level as possible.

  C. Set welder amperage to electrode manufacturer's recommendations. Consider thickness of job, size of electrode and size of job. (Usually 90-120 amps)

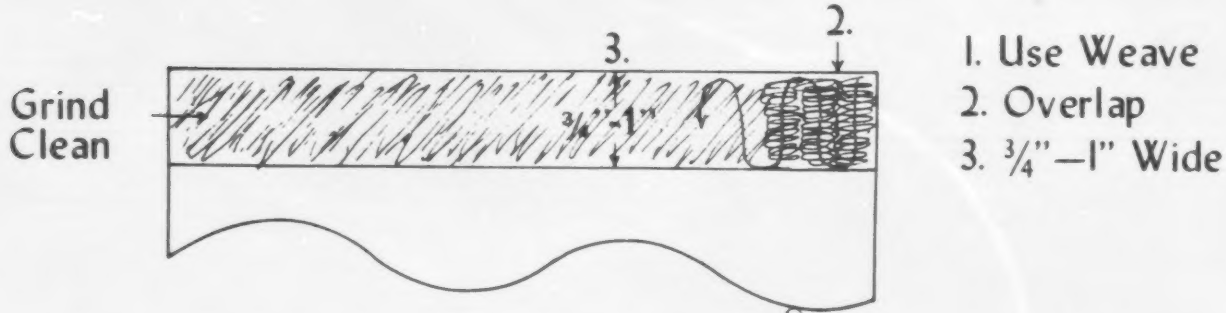
  D. Preheat to 800 degrees F. (Dull red)

  E. Strike arc and run bead - (See Diagram)

    1. Use moderate long arc - 5/32"

    2. Use weaving pass to make a bead 3/4" - 1" in width.

    3. Move from thinner areas to thicker.



HARDFACING (HARDSURFACING)
UNIT XV

JOB SHEET #1--APPLICATION OF HARDFACING MATERIALS USING THE ARC WELDER

A. Examine Bead

1. Remove slag when bead is cool
2. Bead should be smooth, evenly deposited and overlaped to cover all the area to be hardsurfaced
3. Avoid excessive penetration as this delutes and softens the hardfacing material
4. If satisfied with your work, hand in for a grade

HARDFACING (HARDSURFACING)
UNIT XV

JOB SHEET #2--APPLICATION OF HARDFACING MATERIALS USING THE OXYACETYLENE WELDER

Demonstrate your ability to apply hardfacing materials using the oxyactylene torch and cast and tube rod. Follow the procedures shown below.

I. Tools, Equipment and Materials needed

   A. Oxyacteylene welding equipment and related accessory items needed for its operation

   B. Hardfacing rod--cast types and tube type (supplied by instructor)

   C. Scrap mild steel--3/16 - 1/4" thick, 5" to 6" long and at least 2" wide

II. Procedure

   A. Prepare scrap mild steel for hardfacing application

      1. Grind to clean bright condition

      2. Sharpen similar to plow share edge

      3. Round corners and edges

   B. Position plate as level as possible

   C. Select and attach correct size of tip. (See manufacturer's recommendations.)

   D. Adjust working pressure according to manufacturer's recommendation (5 psi acetylene, 15 psi oxygen

   E. Light and adjust flame--manufacturer's recommendation--(usually about 3X (carburizing)

   F. Preheat plate

   G. Start at one end and heat a small area on the corner until the metal comes to sweating temperature. Hold tip at 45 degrees to work pointed in direction of travel and the bulk of the metal

   H. Lift tip slightly and insert rod between plate and inner cone of flame. (See diagram) Melt off rod and spread over the plate by the use of the flame. The molten puddle will spread out as the plate reaches a sweating temperature and will spread in the area covered by acetylene feather of the flame. (Repeat sequence.)

JOB SHEET #2 - APPLICATION OF HARDFACING MATERIALS USING THE OXYACETYLENE WELDER

I. Avoid melting the base metal.

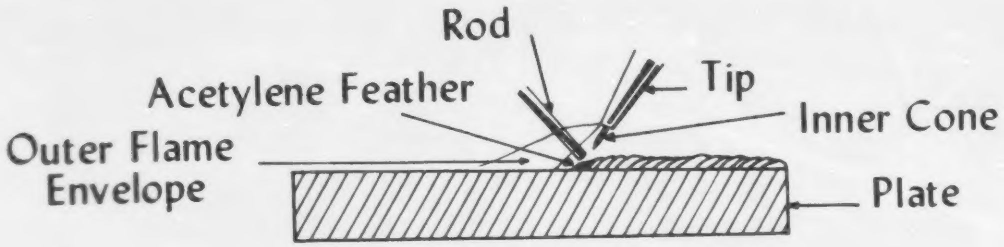
J. Progress in the direction the tip points, applying a thin even coat of material by regulating the amount of rod melted off. Apply a strip of hardsurfacing about 3/4 - 1" in width.

K. Care must be taken when finishing at the end so that not too much heat is applied. Increasing the tip to plate distance and a faster rate of travel can be used to control heat. Avoid burning the edge away.

L. After completing the bead, reheat the whole piece to a uniform temperature and allow to cool slowly. Check your results.

M. Practice the use of both the cast type and the tube type rods.

N. Hand in a sample of each type for a grade.



HARDFACING
UNIT XV

TEST

1. Match the terms with the cirrect response.

_____a. "Brinell"

_____b. Carburizing flame

_____c. Sweating

_____d. Workhardened

_____e. Stoody

1. 3X
2. "Trade Name" for hardfacing materials
3. Resist impact as well as abrasion
4. Excess oxygen
5. Red color from heating starts
6. Hardness Index
7. Resists impact only

2. Indicate the meaning of the following terms related to the kinds of wear.

a. Impact--

b. Abrasion--

c. Friction--

d. Chemical--

3. Match the types of wear to the work condition where they commonly occur.

_____a. Impact

_____b. Abrasion

_____c. Friction

_____d. Chemical

1. Clevis pin
2. Fertilizer spreader parts
3. Plowing sandy soil
4. Plowing rocky soil

4. Name 3 economic reasons for applying hardfacing materials to tools and equipment parts.

a.

b.

c.

5. Demonstrate the ability to apply arc hardfacing materials to a piece of scrap steel. (Use Job Sheet #1 as directions.)

6. Demonstrate the ability to apply oxyactylene hardfacing materials to a piece of scrap steel. (Use Job Sheet #2 as directions)

HARDFACING
UNIT XV

ANSWERS TO TEST

1. a. 6

   b. 1

   c. 5

   d. 3

   e. 2

2. a. Impact wear results when particles of metal are removed by shock effect when the tool is struck a hard blow.

   b. Abrasion wear results when rough material such as sand rub across the tool surface.

   c. Frictional wear results from metal rubbing on metal.

   d. Chemical wear occurs as a result of a chemical reaction eating away the metal. Rust could be considered chemical wear.

3. a. 4

   b. 3

   c. 1

   d. 2

4. a. Increased work time. Fewer breakdowns.

   b. Reduced scheduled maintenance time and labor

   c. Reduced cost for repair parts

5. Performance skills to be evaluated by instructor.

6. Performance skills to be evaluated by instructor.

FIELD SPRAYERS
UNIT XVI

TERMINAL OBJECTIVES

After completion of Unit XVI, the student should be able to select the type of field spray equipment he needs. The student should be able to set up, calibrate, operate and care for field sprayers. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define terms associated with field sprayers and their equipment
2. List the different types of agitation techniques
3. Identify the parts of a spray system
4. Identify the different kinds of sprayer pumps
5. Describe the function of pressure on a sprayer system
6. List the screens used in a sprayer system
7. Select the proper nozzle for the job
8. Adjust spray nozzle so they will give even pattern
9. Follow a definite procedure in cleaning-up and storage of spray equipment
10. Demonstrate the ability to calibrate a field sprayer

FIELD SPRAYERS
UNIT XVI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information and job sheets
3. Make transparencies
4. Discuss terminal and specific objectives
5. Discuss information sheet
6. Demonstrate and discuss procedures outlined in job sheets
7. Give test

Students:

1. Read objectives
2. Study information list
3. Demonstrate the ability to accomplish the procedures outlined in the job sheets
4. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheet
3. Transparency masters
    TM 1--Spray parts
    TM 2--Pumps
    TM 3--Screens
    TM 4--Spray patterns
    TM 5--Boom and Nozzle Adjustment
    TM 6--Calibration formulas
    TM 7--Sprayer calibration alignment chart
4. Job sheet
    #1--Calibrating the Sprayer
5. Test
6. Answers to test

References:

1. Equipment & Calibration Spray Application Guide GAC, 700-196. Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Saw Mill River Road, Ardsley, New York.

2. Farmers Bulletin #2223 USDA "Power Sprayers and Dusters," 1966.

FIELD SPRAYERS
UNIT XVI

INFORMATION SHEET

I. Terms and Definition

A. Agitator--Device in the spray tank necessary to keep the spray material uniformly mixed.

B. Spray tank--Tank which stores the spray solution and agitator

C. Spray pump--Device which delivers the spray material at constant pressure and capacity for a long period of time

D. Boom--Part of spray system which extends out over the field and provides a place for nozzle attachment

E. Nozzle--A device which controls the amount, uniformity, and thoroughness a chemical is applied safely.

F. Jet Agitator--A device to keep wetable powder herbicide in suspension

G. Nozzle Strainer--To prevent nozzle dripping when spray is cut off, use 50 mesh strainer containing automatic shut-off valve assembly.

H. Agitator Line--A hose to return spray solution under pressure to jet agitator in spray tank

I. Shut off Valve--Stops flow of spray solution to boom while pump continues to operate

J. Check Valve--To prevent overdosage when sprayer is stopped

K. Pressure Regulator--Device which controls working spray pressure

L. By-Pass Line--Line which pulls the spray solution flows back to tank when shut off valve is used and pump continues to pump.

M. Suction Line--Line which pulls the spray solution out of tank

N. Suction Strainer--A 50 mesh or coarser strainer attached to the suction line in the tank.

O. Spray Angle--Angle of spray pattern coming out of the nozzle

II. Agitation techniques

A. Return flow

B. Hydraulic jet

C. Mechanical

INFORMATION SHEET

III. Parts of a spray system (Transparency 1)

   A. By-Pass line

   B. Agitation Line

   C. Suction Line

   D. Agitator

   E. Suction Strainer

   F. Pump

   G. Pressure Regulator

   H. Pressure Guage

   I. Shut-off Valve

   J. In-Line Strainer

   K. Boom

   L. Nozzle

   M. Nozzle Strainer

IV. Kinds of Sprayer Pumps (Transparency 2)

   A. Piston Pump

   B. Centrifugal Pump

   C. Diaphragm Pump

   D. Flexible Impeller pump

   E. Gear Pump

   F. Sliding Vane Pump

   G. Roller Pump

V. Pump Pressure needed depends upon:

   A. Type of Pest Control job

   B. Rate of application desired

INFORMATION SHEET

C. Size of nozzles

(NOTE: Too high pressure may atomize spray pattern into fine mist which may cause excessive drift. Should use as low pressure as possible and yet get the job done effectively.)

VI. Sprayer screening devices (Transparency 3)

A. Suction Strainer

B. In-Line Strainer

C. Nozzle Screen

VII. Selecting a Nozzle Tip

A. Types of nozzle tip make up

1. Brass
2. Aluminum
3. Nylon
4. Stainless steel
5. Hardened stainless
6. Chrome plated brass
7. Brass with Tungsten orifice

(NOTE: The harder the material the tip is made of, the higher the price but they last longer.)

B. Tip spray Patterns (Transparency 4)

1. Flat spray nozzle
2. Even Spray nozzle
3. Flooding nozzle
4. Cone nozzle
5. Off-Set nozzle

VIII. Boom and Nozzle Adjustment (Transparency 5)

A. Use all same nozzles on boom

B. Nozzles clean

C. Nozzles properly spaced

D. Boom level with ground

E. Boom correct height

INFORMATION SHEET

IX. Calibration formulas (Transparencies 6 and 7)

X. Procedure For Clean-Up & Storage of Sprayer

   A. Clean out any foreign materials by flushing with nozzles off (new sprayer).

   B. Flush spray system with clean water after each days use

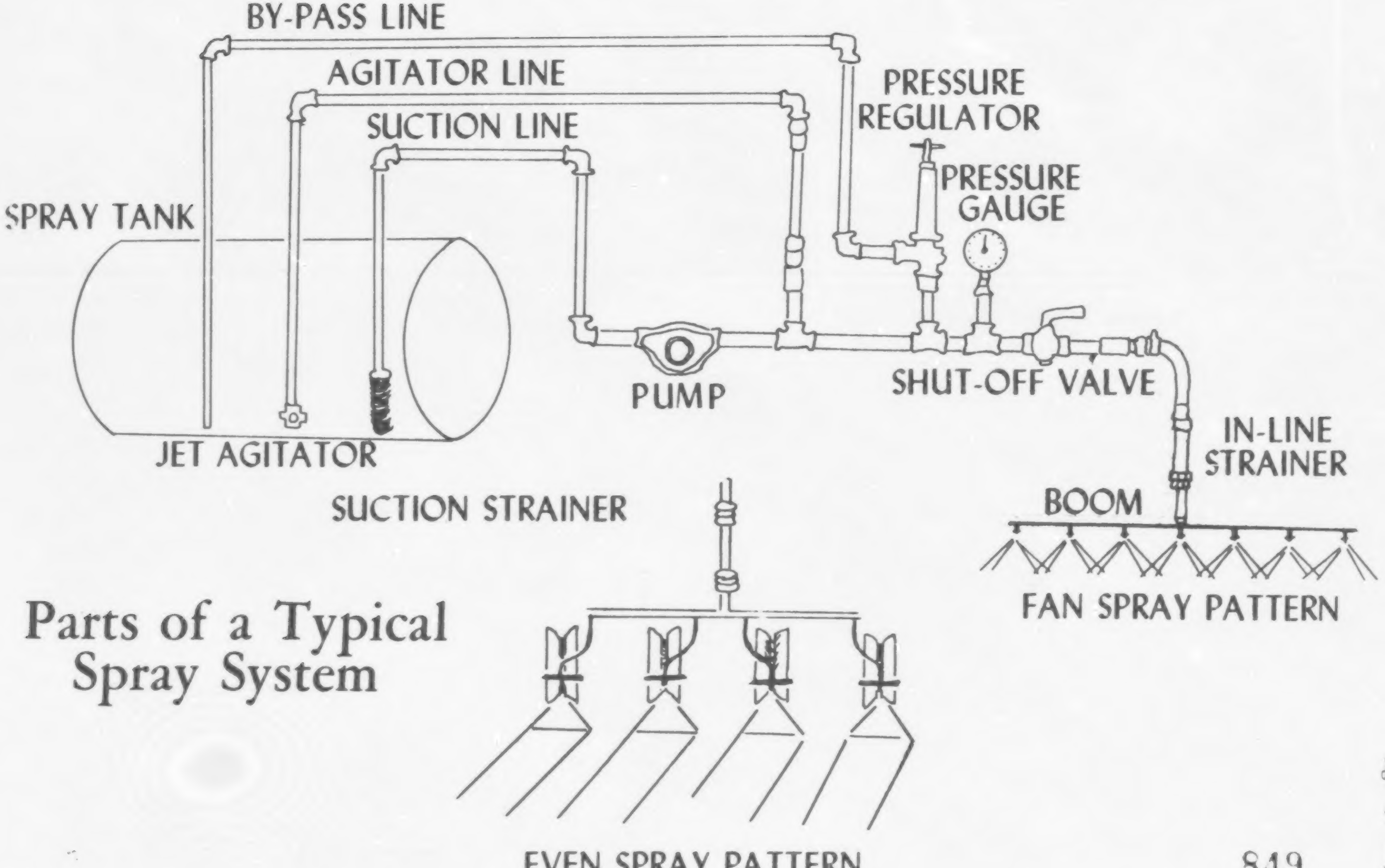
   C. Inspect all strainers, screens and nozzle tips daily

   D. Clean sprayer thoroughly when changing spray material

   E. Long term storage all chemical and residues should be removed from tank, hose and boom, then drain and dry unit. Coat nozzles, pump, and metal moving parts with oil.

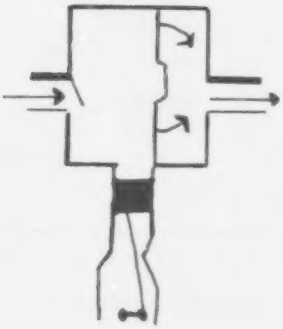
   (NOTE: Consult operator's manual about care of equipment and labels concerning clean up of certain chemicals.)

PARTS OF A TYPICAL SPRAY SYSTEM

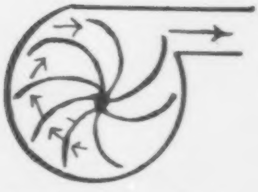

BY-PASS LINE
AGITATOR LINE
SUCTION LINE
PRESSURE REGULATOR
PRESSURE GAUGE
SPRAY TANK
PUMP
SHUT-OFF VALVE
JET AGITATOR
SUCTION STRAINER
IN-LINE STRAINER
BOOM
FAN SPRAY PATTERN
EVEN SPRAY PATTERN

Parts of a Typical Spray System

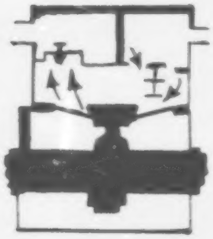
PUMPS



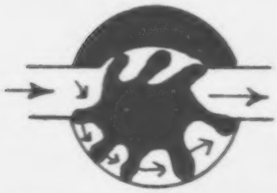
PISTON PUMP



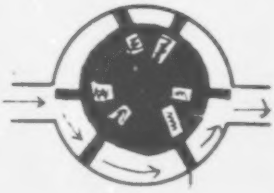
CENTRIFUGAL PUMP



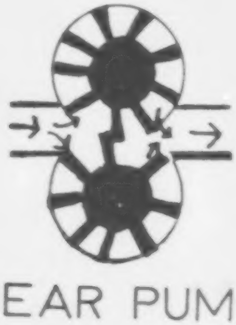
DIAPHRAGM PUMP



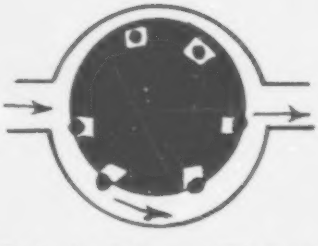
FLEXIBLE IMPELLER PUMP



SLIDING VANE PUMP

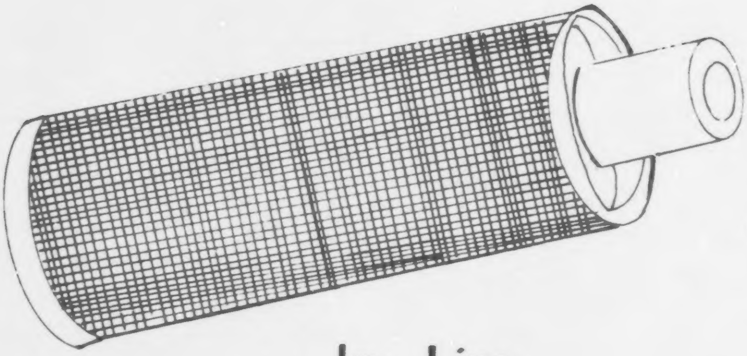


GEAR PUMP

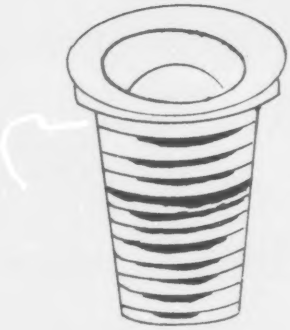


ROLLER PUMP

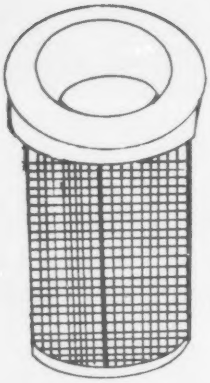
Screens



In—Line



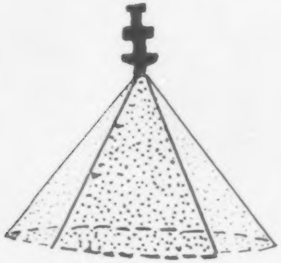
Suction Strainer

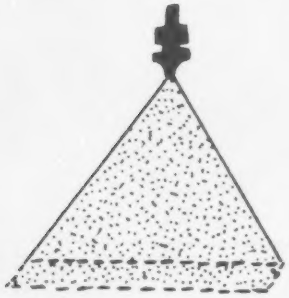


Nozzle Screen

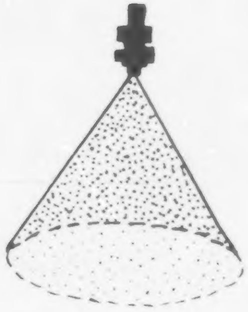
SPRAY PATTERNS

FLAT SPRAY

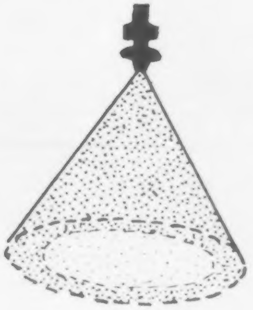




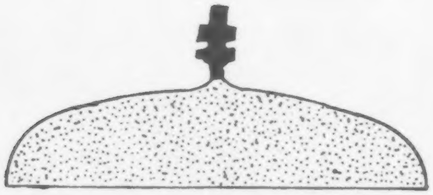
EVEN SPRAY



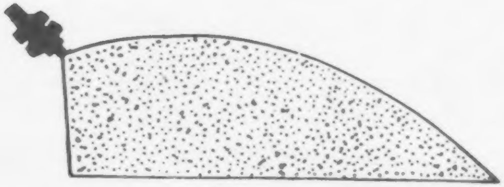
SOLID CONE



HOLLOW CONE

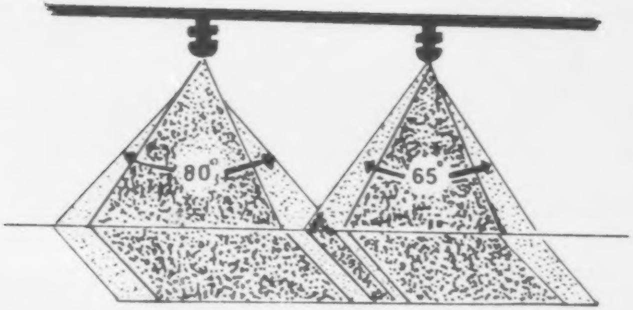


FLOODING

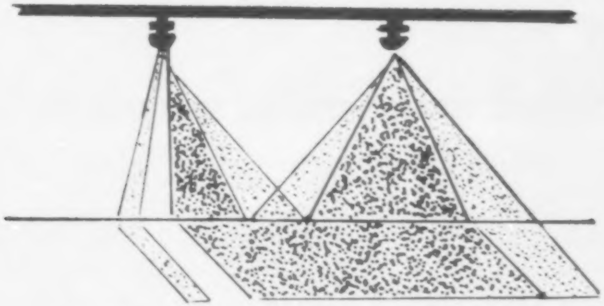


OFF - SET

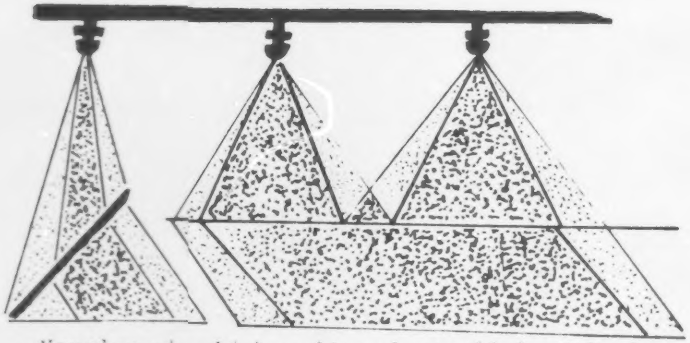
Boom and Nozzle Adjustment



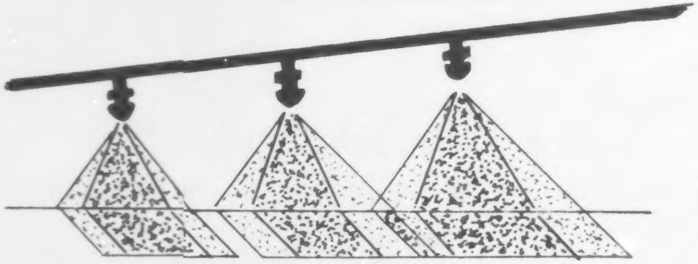
Do not use 80° and 65° nozzles together



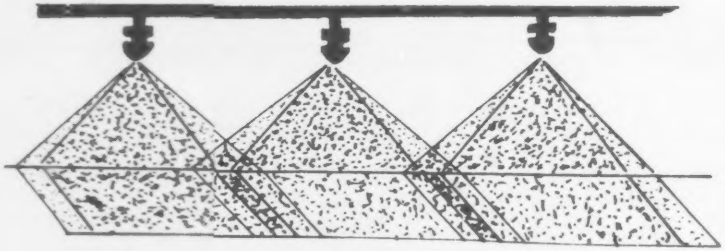
Worn or plugged nozzles cause misapplication



Nozzles should be aligned parallel with the boom



Boom should be level to sprayed surface for uniform coverage



Boom too low or too high will give uneven patterns

CALIBRATION FORMULA

(VOLUME CALCULATION METHOD)

STEP 1. MEASURE OFF 1/8 MILE TO BE SPRAYED (660 FT. or 40 RODS)

STEP 2. START WITH SPRAY TANK FULL OF WATER. SPRAY THE TEST RUN OF 1/8 MILE, USING THE SPRAY PRESSURE AND THE TRACTOR SPEED THAT WILL BE USED WHEN SPRAYING. MARK THE THROTTLE SETTING USED.

STEP 3. REFILL THE TANK, CAREFULLY MEASURING THE AMOUNT OF WATER REQUIRED TO FILL THE TANK.

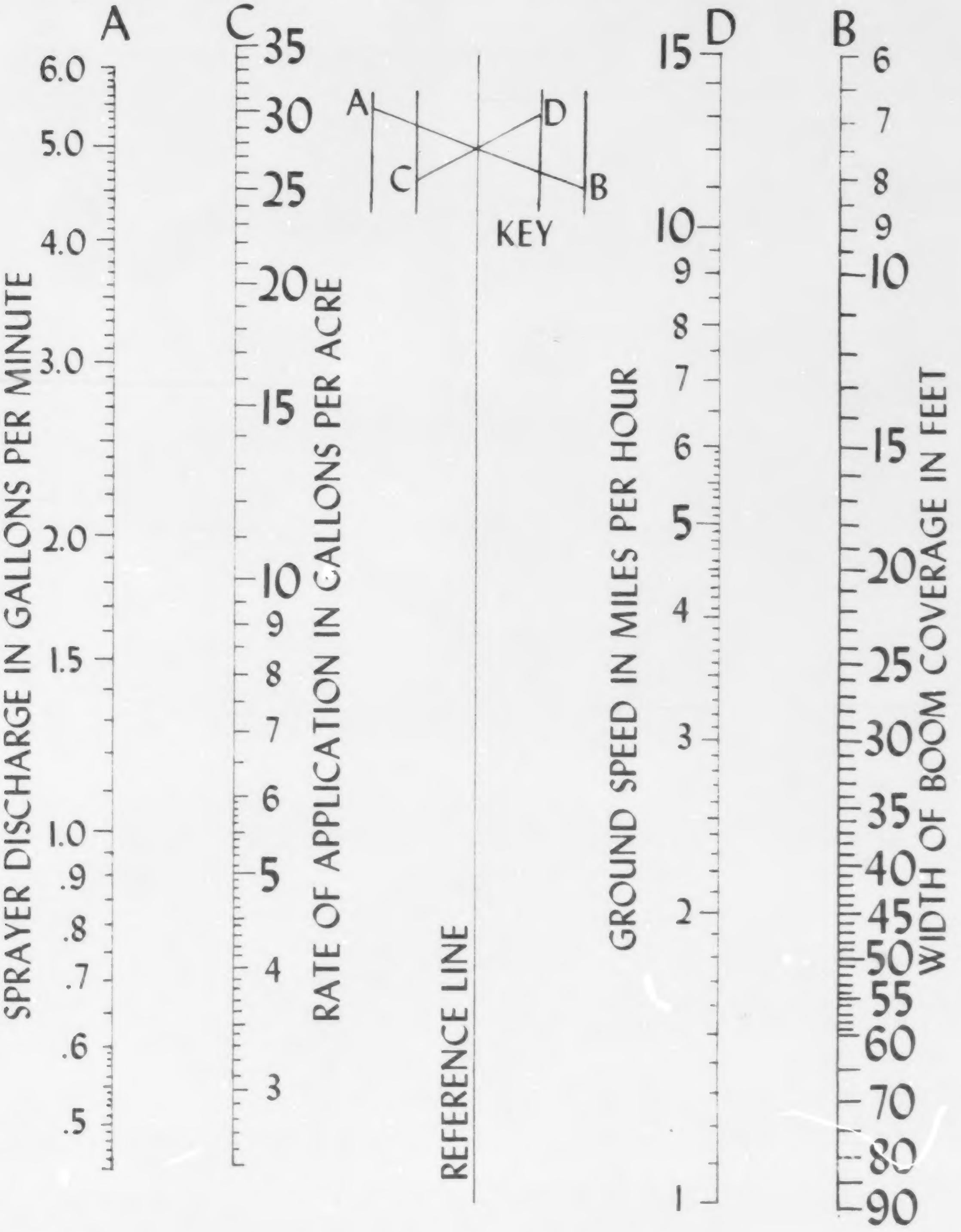
STEP 4. BROADCAST APPLICATION CALCULATION:

$$\frac{\text{GALLONS USED} \times 66}{\text{WIDTH OF SPRAY SWATH IN FEET}} = \text{GALLONS PER TREATED ACRE}$$

STEP 5. DIVIDE THE CAPACITY OF YOUR TANK BY THE GALLONS APPLIED PER ACRE, AS DETERMINED IN STEP 4, TO FIND THE NUMBER OF TREATED ACRES YOU CAN TREAT PER TANK OF SPRAY.

STEP 6. TO DETERMINE HOW MUCH CHEMICAL TO ADD TO THE TANK, MULTIPLY THE RATE PER TREATED RECOMMENDED BY THE NUMBER OF TREATED ACRES YOUR TANK WILL COVER AS DETERMINED IN STEP 5.

Sprayer Calibration Alignment Chart



(Note: If you know three factors, you can determine the fourth)

FIELD SPRAYERS
UNIT XVI

JOB SHEET #1--CALIBRATING THE SPRAYER

I. Tools and Equipment

   A. Tractor

   B. Field Sprayer

   C. Jars or plastic containers

   D. Measuring device for liquids

II. Procedure (2 methods)

   A. 100 foot method (40 inch row spacing)

      1. Measure 100 ft. in field to be sprayed

      2. Clock the time in seconds it takes you to cover the 100 ft. Note the throttle setting.

      3. Set rig still, set throttle at the spraying position. Engage PTO. Set sprayer pressure within recommendations.

      4. Catch output from nozzles for exact period of time clocked in 2 above.

      5. Determine the average output per nozzle, in ounces

      6. On 40-inch rows using 1 nozzle/row, the output in ounces/nozzle equals the gallons of spray mix that will be delivered/acre. Using 2 nozzles-row (nozzles on 20" centers on boom), multiply the average nozzle output by 2 to get the gallons applied/acre using 3 nozzles/row/multiply the overall nozzle output by 3.

      7. Divide capacity of your tank by gallons applied/acre, as determined in step 3, to find the number of acres you can treat per tank of spray.

      8. To determine how much chemical to add to the tank, multiply the rate/acre recommended by the number of acres your tank will cover, as determined in step 7.

   B. Volume Method

      1. Measure 1/8 mile (660 feet or 40 rods).

      2. Start with full tank of water

JOB SHEET #1--CALIBRATING THE SPRAYER

3. Run over the 1/8 mile noting throttle setting and proper spray pressure.

4. Refill tank, carefully measuring the amount of water required to refill tank.

5. Now use this formula

$$\frac{\text{gallons used X 66}}{\text{width of spray swath in feet}} = \text{gallons/acre}$$

OR

$$\frac{\text{gallons used X 66}}{\text{(Band width in inches X number of bands) divided by 12}} = \text{gallons/acre}$$

6. Follow the last two steps in the 100 ft. method above

FIELD SPRAYERS
UNIT XVI

TEST

1. Define the following terms.
   - a. nozzle
   - b. agitator
   - c. pressure regulator
   - d. agitator line
   - e. spray angle

2. List the 3 agitation techniques
   - a.
   - b.
   - c.

3. List four kinds of sprayer pumps
   - a.
   - b.
   - c.
   - d.

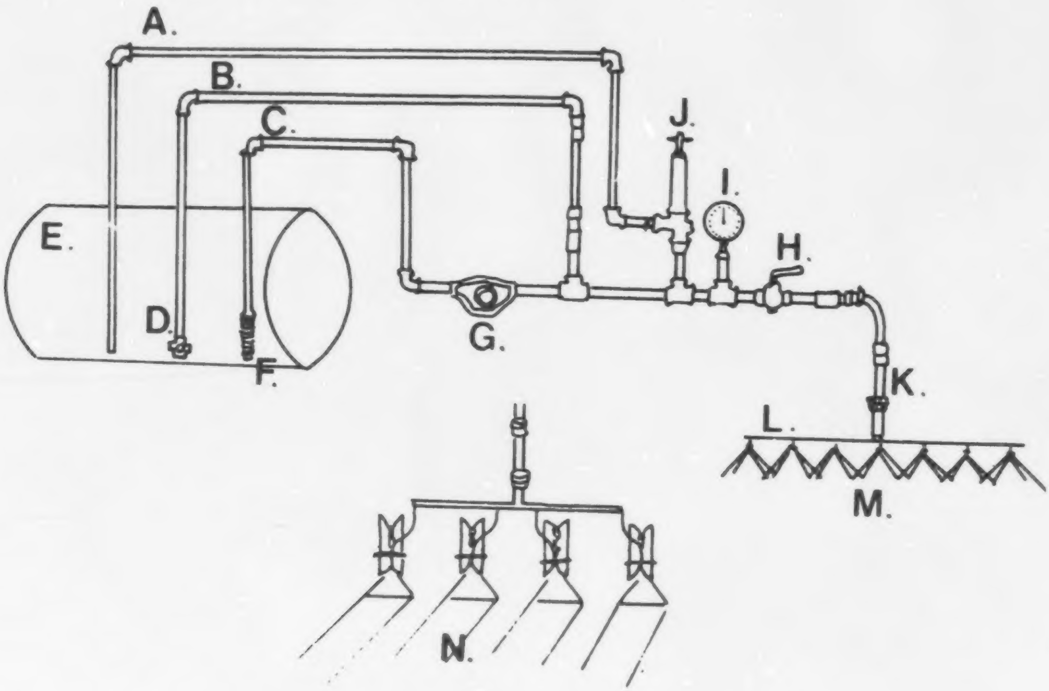
4. Why should one not use too high pump pressure?

5. A series of ______________________ in the sprayer removes foreign material.

6. List 3 types of materials nozzles are made from.
   - a.
   - b.
   - c.

7. What should you look for when adjusting the nozzles properly?

8. Identify these parts of a spray system.



a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

k. ____________________

l. ____________________

m. ____________________

n. ____________________

9. Demonstrate the proper care and clean-up of a field sprayer.

10. Demonstrate the proper calibration of a field sprayer.

FIELD SPRAYERS
UNIT XVI

ANSWERS TO TEST

1. a. Nozzle--Device which controls the amount, uniformity and thoroughness a chemical is applied safely.

   b. Agitator--Device in the spray tank necessary to keep the spray material uniformly mixed.

   c. Pressure regulator--Device which controls working spray pressure

   d. Agitator line--A hose to return spray solution under pressure to jet agitator in spray tank.

   e. Spray angle--Angle of spray pattern coming out of the nozzle.

2. a. Return flow

   b. Hydraulic jet

   c. Mechanical

3. Any four of the following

   a. Piston Pump
   b. Centrifugal Pump
   c. Diaphragm
   d. Flexible
   e. Gear
   f. Sliding
   g. Roller

4. Atomize spray causing drift

5. Screens

6. Any three of the following

   a. Brass
   b. Aluminum
   c. Nylon
   d. Stainless steel
   e. Hardened stainless steel
   f. Buck chrome plated brass
   g. Brass with tungston orifice

7. Boom level, nozzle spacing, and all same nozzles

8. a. By-pass line
   b. Agitator line
   c. Suction line
   d. Jet agitator
   e. Spray tank
   f. Suction strainer
   g. Pump
   h. Shut-off valve
   i. Pressure
   j. Pressure regulator
   k. In-line strainer
   l. Boom
   m. Fan spray pattern
   n. Even spray pattern

9. Performance skills to be evaluated by the instructor.

10. Performance skills to be evaluated by the instructor.

HYDRAULICS
UNIT XVII

TERMINAL OBJECTIVES

After completion of Unit XVII, the student should be able to service and do minor repair on common hydraulic systems of farm tractors. He should be able to understand the basic principals of hydraulics. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Write a short paragraph including Pascal's Law to explain the basic principles of hydraulics.
2. Sketch and label the 5 basic parts of a simple hydraulic system.
3. Match terms associated with hydraulics to the correct definition.
4. Identify 3 kinds of hydraulic pumps
5. Identify sketch of 2 common types of hydraulic systems.
6. Label the parts of a single action cylinder.
7. Label the parts of a double action cylinder.
8. Describe the specifications of the two standard sizes of remote cylinders.
9. List 3 major reasons for system breakdown.
10. Match hydraulic system failures with probable causes
11. Name three contaminants of hydraulic fluid.
12. Identify the 3 common types of reuseable hose connections.
13. Distinguish between a high pressure hose and a low pressure hose.
14. Explain in short paragraph how to determine what type of hydraulic fluid or oil to use in a specific hydraulic system.
15. List 3 signs of problems in hydraulic systems.
16. Demonstrate the replacement of the filter on a typical hydraulic system.
17. List the steps in daily service of a specific hydraulic system.

HYDRAULICS
UNIT XVII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with objective sheet
2. Provide students with information sheets
3. Make transparencies
4. Discuss objectives
5. Discuss information sheets
6. Collect samples of hoses, cylinder, pumps, etc. for demonstration
7. Arrange field trip to study hydraulic repair and service equipment
8. Give test

Students:

1. Read objective sheet
2. Study information sheets
3. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information sheets
3. Transparency masters
   - TM 1--Basic Principle of Hydraulics
   - TM 2--Basic Parts of Hydraulic System
   - TM 3--Three Types of Hydraulic Valves
   - TM 4--Three Common Types of Hydraulic Pumps
   - TM 5--Two Types of Hydraulic Systems
   - TM 6--Single Action and Double Action Cylinder
   - TM 7--Features of Standard Remote Cylinders
   - TM 8--Three Types of Reuseable Hose Fittings
4. Test
5. Answers to test

Additional Materials:

1. Teaching Kit - Hydraulics, available from Standard Oil Division of American Oil Company. Very good material includes:
   a. student booklets, teachers booklet, pre-tests, port test, learning activities, and transparency masters. Cost about $8.00.
2. Tractor Hydraulics, AAUIM, Coordinators Office, Agriculture Engineering Office, Athens, Georgia.

3. Hydraulic Power Transmission, Standard Oil, Division of American Oil Company, Kansas City, Missouri.

4. FOS - Fundamentals of Service - Hydraulics, available through your local John Deere Dealer.

5. Tractor Maintenance AAUIM, Coordinator's Office, Agriculture Engineering Building, Athens, Georgia.

6. Tractor Repair and Maintenance, Department of Agriculture Education, University of Nebraska, Lincoln, Nebraska.

HYDRAULICS
UNIT XVII

INFORMATION SHEET

I. The basic principle of hydraulics as stated by Pascal in the seventeenth century is: Pressure applied at any point in a static fluid is the same in all directions and acts with equal force in all directions. (Transparency 1)
(NOTE: If the large piston in TM 1 is 3 times larger than the small piston--the force exerted by the small piston can be 3 times the large piston. However, the distance traveled by the large piston will be 1/3 that of the small piston.)

II. The five basic parts of a simple hydraulic system are: (Transparency 2)

A. pump

B. valves

C. reservoir

D. cylinder

E. lines or piping

III. The function of the five basic parts are:

A. pump--to move fluid within the system

B. valves--control the pressure direction and volume of flow

C. reservoir--hold excess oil, maintain oil level above the section line opening, allowing air and foreign matter to separate from the oil and dissipate heat during normal operation.

D. cylinder--convert fluid power to mechanical power-piston cylinder gives straight power vane cylinders give rotary power

E. lines or piping--transport fluid within the system

IV. Terms and definitions

A. Pump--a device that converts mechanical force to fluid power.

B. Valve--controls direction, pressure, or volume of flow. There are three common types (Transparency 3)

C. Resorvoir--holds excess oil maintains oil level above the suction line opening, allows air and foreign matter to separate from the oil and dissipates heat during normal operation.

D. Cylinder--converts fluid power to mechanical power

INFORMATION SHEET

E. Line or piping--carries fluid within the system

F. Relief valve--used to limit or maintain pressure in a system

G. Volume control valve--limits or increases the volume of fluid to or from a hydraulic cylinder or motor.

H. Pressure control valve--limits or maintains pressure within the system

I. Directional flow valve--controls the direction of flow to and from an activator

J. External leakage--loss of fluids out of the system

K. Internal leakage--leakage past seals inside the system. I.E. pistons, valves, pumps.

L. Drain schedule--periodic draining of the system as recommended by the manufacturer.

M. Flow--the movement of fluid through the system

N. Filter--device for removing foreign material from fluid

O. Fluid--the oil used to transmit force within the system

P. Bleed--removal of air from the system

Q. Single action cylinder--force is applied in only one direction

R. Double action cylinder--force is applied in two directions

S. Low pressure hose--used in applications where pressure on 1" hose will generally not exceed 800 psi.

T. Medium pressure hose--used in applications where pressure on 1" hose will not exceed 1875 psi.

U. High pressure hose--used in applications where pressure on 1" hose will not exceed 3000 psi.

V. Permanent hose fitting--hose and fittings that are crimped or swedged together and usually discarded when replacement is necessary

W. Reuseable hose fittings--fittings are usually screwed or clamped on and when the hose wears out the fittings can be reused.

X. Quick couplers--are used to connect oil lines that are disconnected frequently.

INFORMATION SHEET

Y. Seals--used to prevent oil from escaping from chambers within the system and out of the system

Z. Hydraulic motor--a type of cylinder used to convert fluid power to rotary power.

AA. Open center system--the pump runs all the time even if pressure is not needed.

BB. Closed center system--the pump "takes a break" during neutral.

CC. Remote cylinder--a hydraulic cylinder mounted away from the supply source.

V. The three common kinds of hydraulic pumps used in agriculture are: (Transparency 4)

A. Gear--the pack horse of hydraulic systems. Widely used because they are simple and economical. Two types of gear pumps are:

(a) external

(b) internal

B. Vane--a versatile pump and can be used in single, double, or triple units

C. Piston--are favored by modern systems that require high speeds and high pressures. One disadvantage is that they are complex and more expensive than vane or gear pumps.

VI. The two common types of hydraulic systems are: (Transparency 5)

A. Open center system--the pump runs constantly, even if in neutral. There is a continous flow of oil from the reservoir to the pump, to the control valve, and back to the reservoir. In neutral, oil flows through the control valve and back to the reservoir.

B. Closed center system--the pump "takes a break" during neutral. The control valve stops (deadends). The flow of oil from the pump the closed center feature. This causes the pump to stop pumping oil (shut off by a pressure regulating valve). However, if the pressure of the oil drops below full system pressure during neutral, the pump starts pumping agin long enough to build up the pressure.

VII. The parts of a single action chlinder are: (Transparency 6)

A. Mount

B. Oil inlet

C. Piston

D. Piston seal

INFORMATION SHEET

E. Piston rod

F. Air vent

G. Rod wiper seal

H. Cylinder housing

VIII. The parts of a double action cylinder are: (Transparency 6)

A. Mount

B. Oil port

C. Piston seals

D. Piston

E. Oil port

F. Removable end

G. Piston rod

H. Rod seal

I. Cylinder housing

IX. The two standard sizes of remote hydraulic cylinders are: (Transparency 7)

A. Normal application

1. 1" mounting pin

2. 8" stroke

B. Heavy duty applications on tractors with more than 80 HP.

1. 1" mounting pin

2. 8" stroke

3. More than 18,000 lbs. of thrust

X. Reasons for breakdown of a hydraulic system

A. Dirty oil

B. Improper type of oil

C. Water in oil

INFORMATION SHEET

XI.

Hydraulic System Failures	Probable Causes of Failure
A. Pump makes excessive noise	1. Air leaking into system
	2. Loose or worn parts
	3. Sticking vane in pump
	4. Pump running in excess of rated speed
	5. Oil of too high viscosity or too high pour point
	6. Plugged reservoir vent
	7. Plugged or restricted intake line or filter
	8. Pump misaligned with motor
B. Hydraulic System Overheats	1. Oil viscosity too high
	2. Relief valve set too high
	3. Excessive friction
	4. Oil cooler inoperative
	5. Pump discharge not unloading properly
	6. Restricted or undersize valves or hydraulic lines
C. Eratic action of cylinders	1. Valves sticking or binding
	2. Cylinder sticking or binding
	3. Air in system
	4. Sluggish during warmup
	5. Internal leakage in cylinder or valves
	6. Pilot control pressure too low

XII. The three contaminants of hydraulic fluid are:

A. Dust or dirt

B. Water

C. Air

XIII. Common types of reuseable hose connections (Transparency 8)

XIV.

A. A high pressure hose will generally have at least 1 and up to 3 layers of metal braided reinforcement

B. Low pressure hose will usually have only 1 layer of braided fabrics or steel reinforcement.

XV. For any piece of equipment the manufacturer will provide an operator's and/or service manual which should specify the type of fluid to be used in the system. The operator should become familiar with the requirements and not make any changes.

XVI. Signs of problems in a hydraulic system are:

A. Excessive pump noise

INFORMATION SHEET

B. Excessive wear of moving parts

C. System overheating

D. Fluid leaks (external)

E. Internal leakage as evidenced by cylinder movement when controls are in stationary position

F. Pump does not deliver oil

G. Fluid level low

H. Eratic action of cylinders

XVII. Replacement of filter on a typical hydraulic system

A. Refer to operator's and/or service manual for proper replacement filter.

B. Procure new filter element.

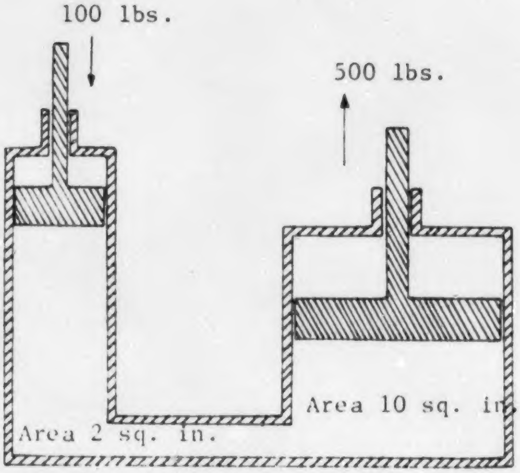
C. Clean area around filter housing

D. Remove old filter

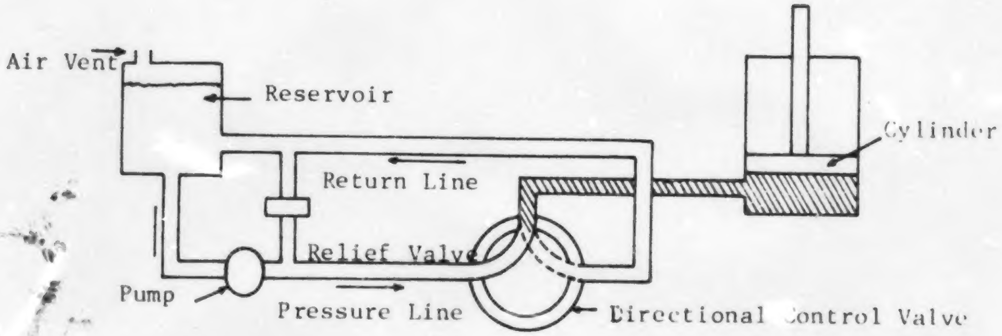
E. Check old filter for any obvious contaminants such as steel cuttings, brass cuttings, dirt, lint, rubber, etc.

F. Install new filter and seal on filter compartment

G. Start up system and check filter cartridge for leaks

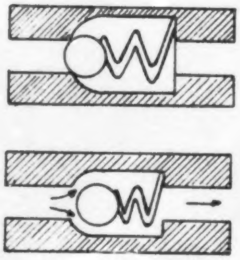

100 lbs.
500 lbs.
Area 10 sq. in.
Area 2 sq. in.

Basic Principle of Hydraulics

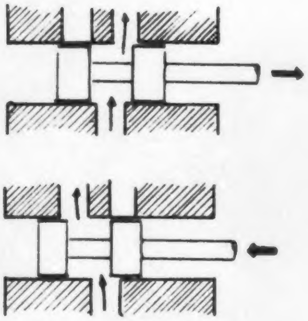

Air Vent
Reservoir
Cylinder
Return Line
Relief Valve
Pump
Pressure Line
Directional Control Valve

Basic Parts of Hydraulic System

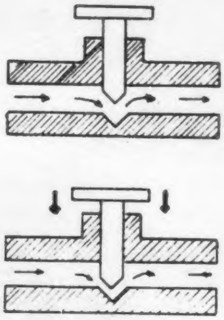
Three Types of Valves



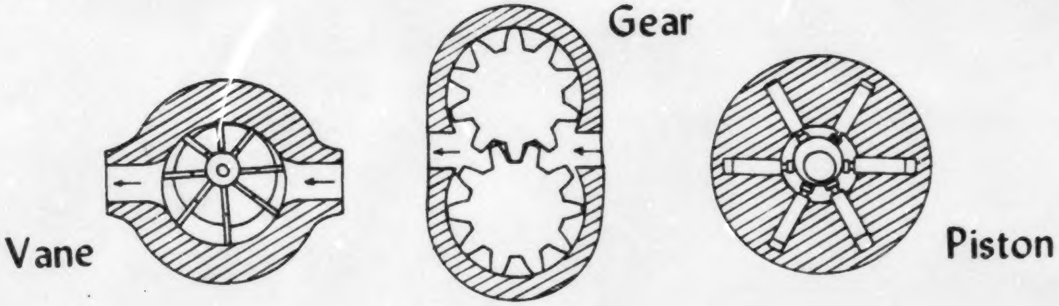
Pressure Control



Directional Control

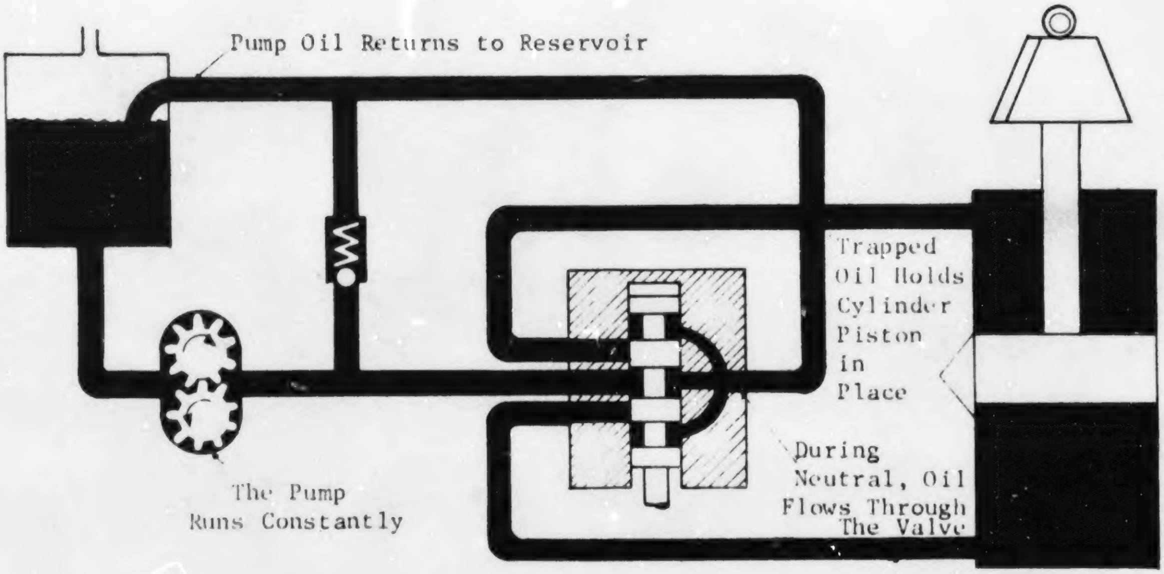


Volume Control

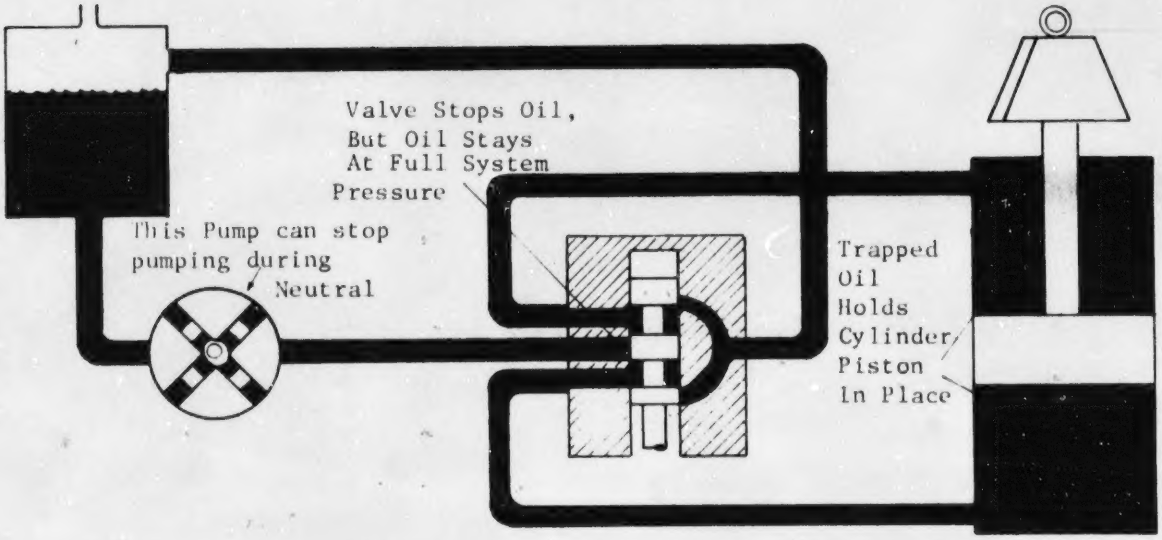

Gear
Vane
Piston

Three Common Types
of Hydraulic Pumps

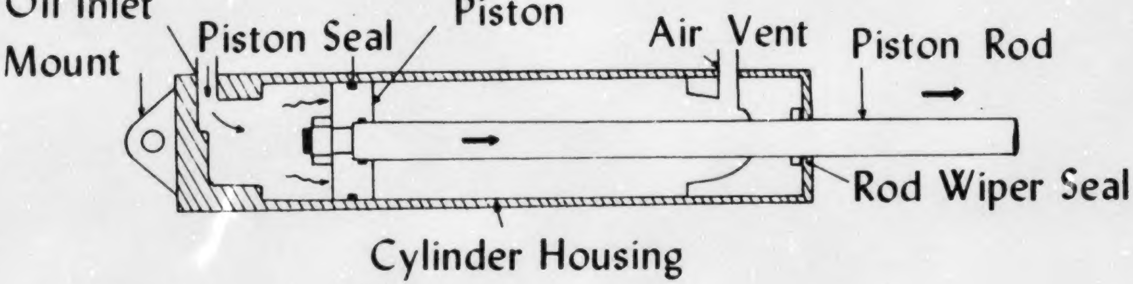
TWO COMMON HYDRAULIC SYSTEMS


Pump Oil Returns to Reservoir
Trapped Oil Holds Cylinder Piston in Place
During Neutral, Oil Flows Through The Valve
The Pump Runs Constantly

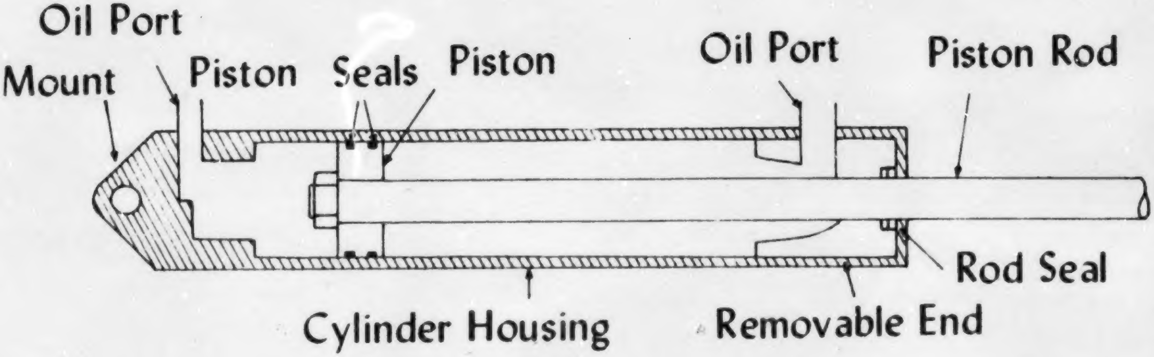
OPEN CENTER SYSTEM


Valve Stops Oil, But Oil Stays At Full System Pressure
This Pump can stop pumping during Neutral
Trapped Oil Holds Cylinder Piston In Place

CLOSED CENTER SYSTEM

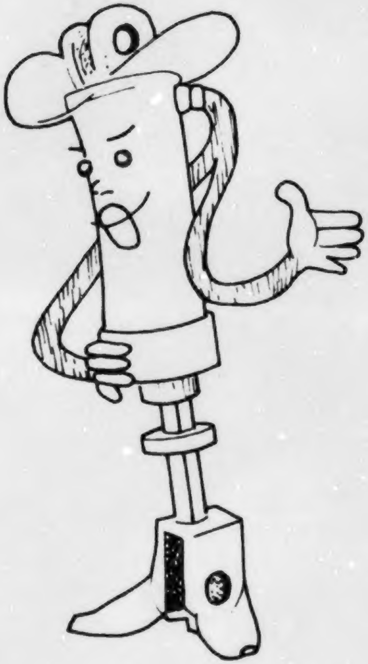

Oil Inlet
Mount
Piston Seal
Piston
Air Vent
Piston Rod
Rod Wiper Seal
Cylinder Housing

A Typical Single-Acting Cylinder


Oil Port
Mount
Piston
Seals
Piston
Oil Port
Piston Rod
Rod Seal
Cylinder Housing
Removable End

A Typical Double-Acting Cylinder

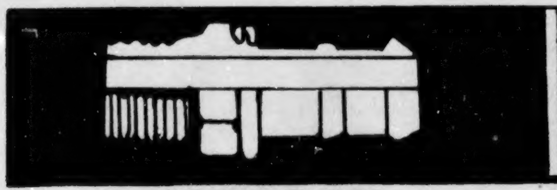
We have standardized features



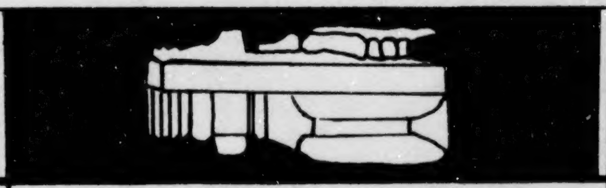
1 - 1 inch mounting pins

2 - 8 inch stroke

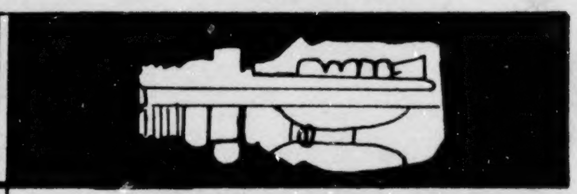
You can change cylinders between implements!



SOCKETLESS
(Low Pressure)



SOCKET AND NIPPLE
(Medium Pressure,
Single Wire Braid Hose)



SOCKET AND NIPPLE
(High Pressure - Notch on Socket)
(Multiple Wire Braid Hose)

TM 8

881

882

Ag. IV - 549-D

HYDRAULICS
UNIT XVII

TEST

1. Write a short paragraph using Pascal's law and explain the basic principal of hydraulics.

2. Sketch and label a simple hydraulic system to show the 5 basic parts.

3. Match the following terms to the proper definition:

_____a. pump

_____b. valve

_____c. reservoir

_____d. cylinder

_____e. line or piping

_____f. relief valve

_____g. volume control valve

_____h. pressure control valve

_____i. flow

_____j. drain schedule

_____k. directional flow valve

_____l. external leakage

_____m. internal leakage

_____n. filter

_____o. fluid

_____p. bleed

_____q. single action cylinder

_____r. double action cylinder

_____s. low pressure hose

_____t. medium pressure hose

_____u. high pressure hose

_____v. permanent hose fitting

1. hydraulic cylinder mounted away from the supply source.
2. type of cylinder used to convert fluid power to rotary power.
3. the pump runs all the time even if the pressure is not needed
4. used to prevent oil from escaping from the chambers within the system and out of the system
5. the pump "takes a break" during neutral
6. controls the direction pressure or volume of flow
7. used to increase or decrease pressure in a system
8. limits or increases the volume of fluid to or from a cylinder
9. limits or maintains pressure within the system
10. controls the direction of flow to and from an activator
11. loss of fluid out of the system
12. leakage past seals, valves, pistons, or pumps
13. periodic draining of the system as recommended by the manufacturer
14. movement of fluid through the system
15. converts mechanical force to fluid power
16. holds excess oil, maintains oil level above the suction line opening, allows air and foreign matter to separate from the oil and dissipates heat during normal operation.
17. converts fluid power to mechanical power.

_____w. reuseable hose fitting

_____x. quick couplers

_____y. seals

_____z. hydraulic motor

_____aa. open center

_____bb. closed center system

_____cc. remote cylinder

18. carries fluid within the system

19. device for removing foreign material from fluid

20. the oil used to transmit force within the system

21. removal of air from the system

22. force can be applied in only one direction

23. force can be applied in two directions

24. hose used in applications where pressure on a 1" hose will generally not exceed 800 pse.

25. hose used in applications where pressure on a 1" hose will generally not exceed 1875 psi.

26. hose used in applications where pressure on a 1" hose will not exceed 3000 psi.

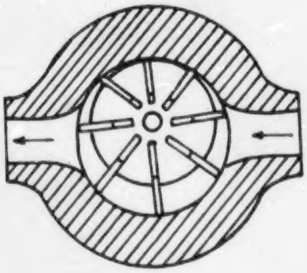
27. hose and fitting are crimped or swedged together and usually discarded when replacement is necessary.

28. fittings are usually screwed or clamped on and when the hose wears out the fittings can be reused.

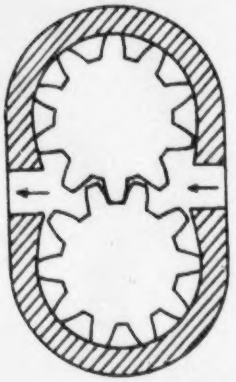
29. used to connect oil lines that are disconnected frequently.

4. Identify the three following drawings of common hydraulic pumps.

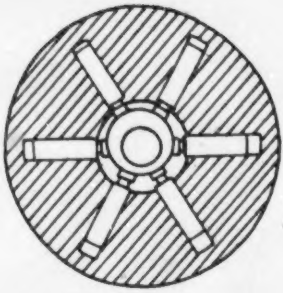
Hydraulic Pumps



a.__________________________

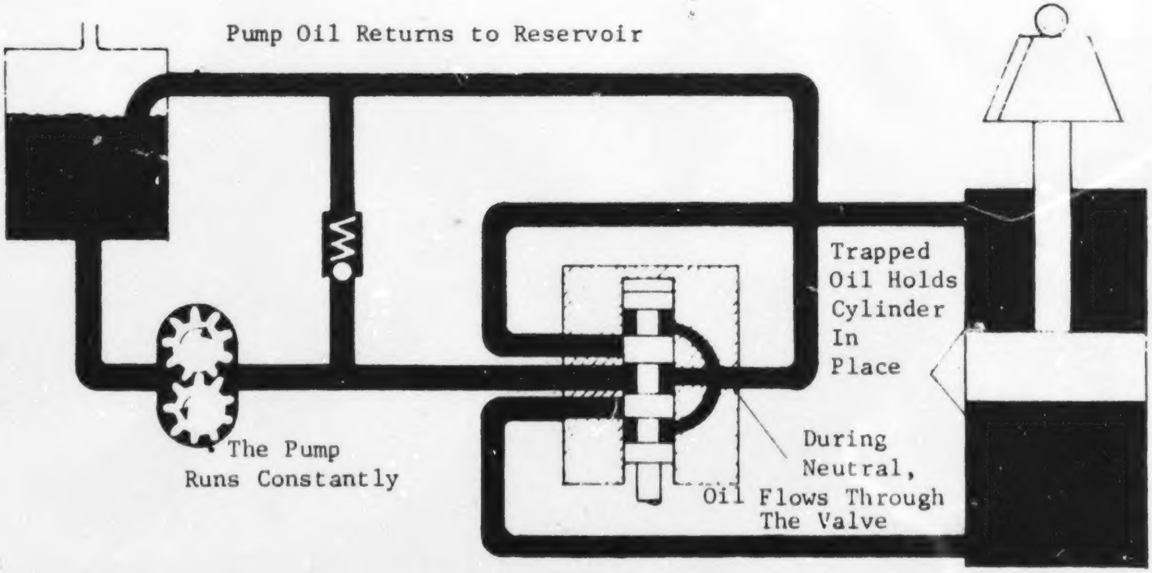


b.__________________________

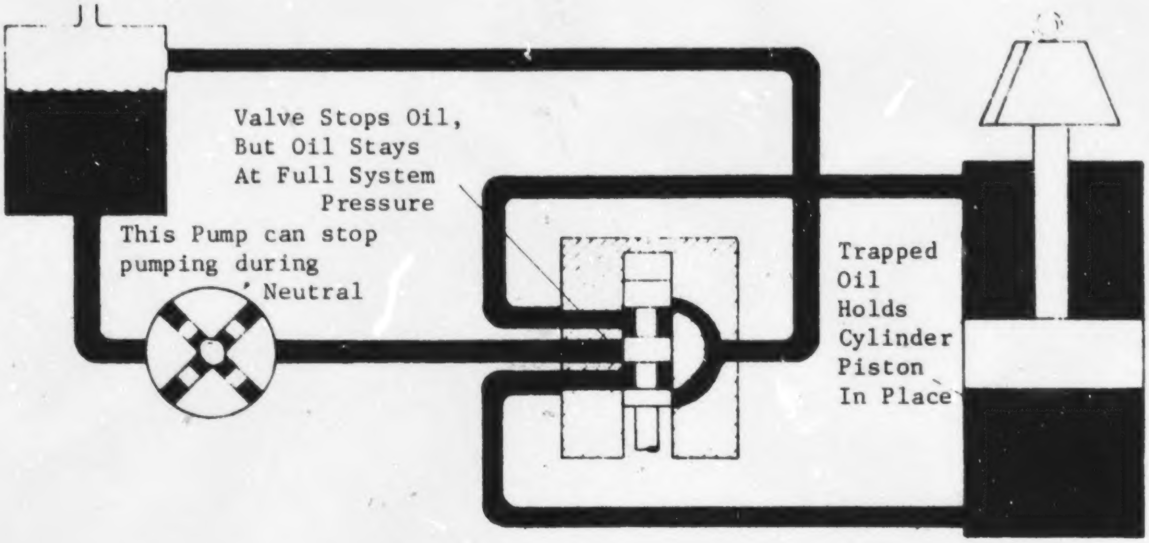


c.__________________________

5. Identify the following two common hydraulic systems

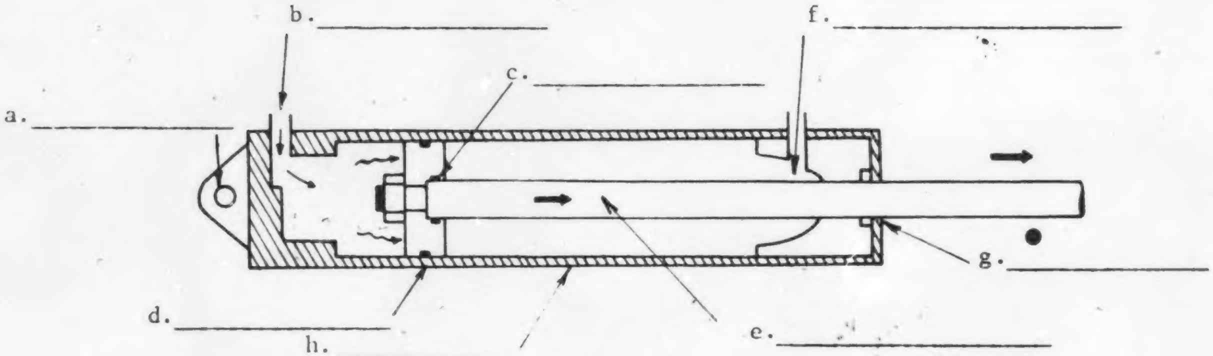

Pump Oil Returns to Reservoir
Trapped Oil Holds Cylinder In Place
The Pump Runs Constantly
During Neutral, Oil Flows Through The Valve

a. ______________________________


Valve Stops Oil, But Oil Stays At Full System Pressure
This Pump can stop pumping during Neutral
Trapped Oil Holds Cylinder Piston In Place

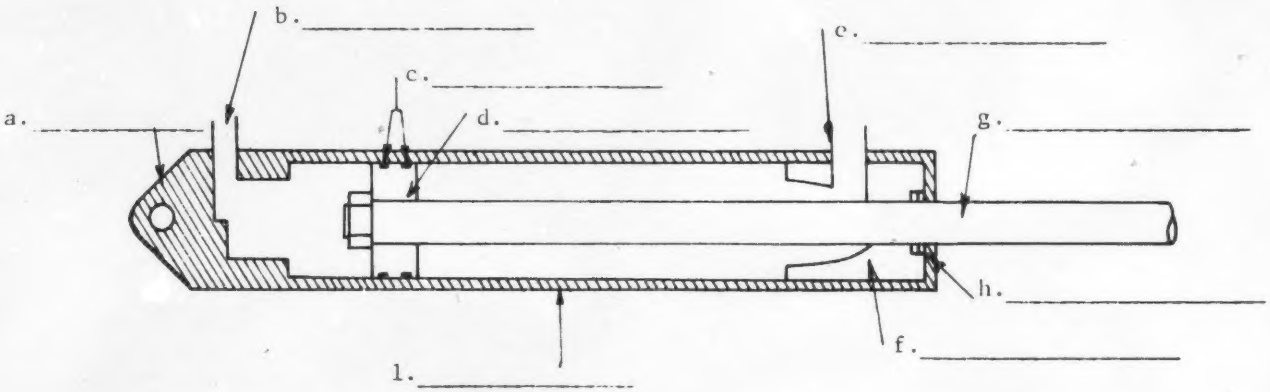
b. ______________________________

6. Label the parts of the following hydraulic cylinder.



A Typical Single-Acting Cylinder

7. Label the parts of the following hydraulic cylinder.



A Typical Double-Acting Cylinder

8. Describe the specifications of the two standard sizes of remote cylinders.

	Small	Large
length of stroke	a.__________	e.__________
diameter of mounting pins	b.__________	f.__________
lbs. of thrust	c.__________	g.__________
size of tractor to be used on	d.__________	h.__________

9. List three major reasons for breakdown of hydraulic systems.

a.______________________________

b.______________________________

c.______________________________

10. Match the system failures on the left with probable causes on the right.
(NOTE: Each failure may have more the 1 cause. Some failures may have the same causes.)

Problems

a. Pump makes excessive 1. noise _______________

b. Hydraulic system overheats. _______________

c. Eratic Action of cylinders. _______________

Probable Causes

1. Air leaking into system
2. Relief valve set too high
3. Pump discharge not unloading properly
4. Pump running in excess of rated speed
5. Plugged reservoir vent
6. Internal leakage
7. Sluggish during warmup
8. Valves sticking or binding
9. Oil too high viscosity
10. Pump misaligned with motor
11. Excessive friction
12. Plugged or restricted intake line
13. Loose or worn parts, in pump.
14. Pilot control pressure too high

14. Explain in short paragraph how to determine what type of oil or hydraulic fluid to use in a specific hydraulic system.

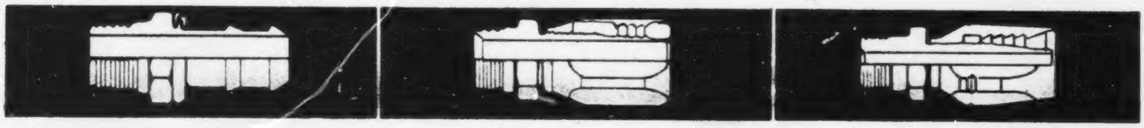
11. List three contaminantes of hydraulic fluid

a. ____

b. ____

c. ____

12. Identify the three following types of reuseable hose fittings.



a. ______________ b. ______________ c. ______________

13. Using the samples provided by your instructor - identify:

a. Low pressure hose -

b. High pressure hose -

15. List three signs of problems in a hydraulic system.

    a.

    b.

    c.

16. List the steps in daily service of a specific hydraulic system.

    a.

    b.

    c.

    d.

HYDRAULICS
UNIT XVII

ANSWERS TO TEST

1. The basic principal of hydraulics as stated by Pascal in the seventeenth century is: Pressure applied at any point in a static fluid is the same in all directions and acts with equal force in all directions. (see transparency 1)

2. Sketch should include the following:

   pump, reservoir, cylinder, valves, lines or piping.

3. Answers to matching quiz.

   a. 15
   b. 6
   c. 16
   d. 17
   e. 18
   f. 9
   g. 8
   h. 7
   i. 14
   j. 13
   k. 10
   l. 11
   m. 12
   n. 19
   o. 20
   p. 21
   q. 22
   r. 23
   s. 24
   t. 25
   u. 26
   v. 27
   w. 28
   x. 29
   y. 4
   z. 2
   aa. 3
   bb. 5
   cc. 1

4. a. vane
   b. gear
   c. piston

5. a. open center system
   b. closed center system

6. Parts of single action cylinder:

   a. mount
   b. oil port
   c. piston
   d. seal
   e. piston rod
   f. air vent
   g. rid wiper seal
   h. cylinder housing

7. Parts of double action cylinder:

   a. mount
   b. oil port
   c. seals
   d. piston
   e. removable end
   f. piston rod
   g. rod seal
   h. cylinder housing

8. Specifications of remote cylinders:

   a. 8"
   b. 1"
   c. 6,000 to 12,000
   d. 20 to 80 HP
   e. 16"
   f. 1"
   g. 11,000 to 18,000
   h. 80 to 200 HP

9. Reasons for breakdown:

   a. dirty oil
   b. improper type of oil
   c. water in oil

10. Match failures and causes

    a. 1,3,4,8,9,10,12,13,14
    b. 2,3,4,8,9,11,12,13,14
    c. 1,5,6,7,8,9,12,13

11. Three contaminents:

    a. dust & dirt
    b. water
    c. air

12. Types of hose fittings

    a. socketless
    b. socket & nipple
    c. socket and nipple, notch on socket

13. a. low pressure will only have 1 or less layers of braided reinforcement

    b. high pressure will have at least 1 and up to 3 layers of steel and/or fabric reinforcement.

14. The manufacturer of every hydraulic system will provide an operator's manual and/or a service manual which will include specifications of oil to be used in the system. Also some systems will have a plate or instructions printed on the equipment.

15. a. pump does not deliver oil
    b. fluid level low
    c. eratic action of cylinders

16. Steps in daily service:

    a. check fluid level

    b. inspect all lines, hoses, cylinders and pump(s) for signs of leakage.

    c. inspect mounts, pins, and mechanical parts for missing parts, signs of wear or breakage.

    d. operate system on test and listen for any unusual noises, and vibrations.